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Educational Psychology

INCLUDING EXPERIMENTAL PEDAGOGY, CHILD PHYSIOLOGY AND
HYGIENE, AND EDUCATIONAL STATISTICS

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THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

THE CLASS EXPERIMENT IN PSYCHOLOGY WITH ADVERTISEMENTS AS MATERIALS.

ROBERT M. YERKES.

Harvard University.

What has come to be known as the "class experiment" is proving to be invaluable in the teaching of psychology. The general method has been admirably described in this Journal by Professor Seashore,¹ with whose views concerning it the writer finds himself in hearty accord. It involves, as Professor Seashore has pointed out, three important points: (1) that each student in the class shall take responsible part, as observer, in the experiment; (2) that the work, unlike that of the "demonstration experiment," shall be sufficiently intensive to be vital in the training of the student; and (3) that each step in the experiment, as well as the results, shall be explained and interpreted in the interests of training in observation.

Above all else, the class experiment forces reaction on the part of every student. It demands careful observation and description and the employment of varied methods of dealing with the data of observation. If skillfully used it should serve to arouse interest, and stimulate to serious work students who otherwise would remain passive recipients of psychological information. As a rule the technique of the experiment should be in the hands of the teacher, and it should be the task of each member of the class to observe, record and interpret certain psychological phenomena for the study of which especially favorable conditions are provided by the experiment.

¹Seashore, C. E., "The Class Experiment," *Journal of Educational Psychology*, 1910, 1: 25-30.

For a number of years the writer has used class experiments, with increasing success, in his introductory courses in psychology, and it is his conviction that a profitable series of experiments may be arranged to supplement lectures or recitations with the expenditure of not more than one dollar per student.

Among the ideally inexpensive and highly satisfactory materials which have been used for class experiments are advertisements. Initial experiments were made with half-page magazine advertisements. Subsequently full-page advertisements were selected from magazines and a set of five (or ten)² was prepared for each student. At present our supply is obtained from electro-plates in the Harvard Laboratory. Frequently it is possible to buy for a few dollars a hundred copies of a back number of a popular magazine which contains scores of full-page advertisements that are likely to prove useful for psychological purposes. The necessary cost of providing a set of five or ten is not over ten cents per student.³

The writer's purpose in using advertisements with classes in psychology is three-fold. First, to interest students in mental events, and to aid them in observing them. Second, to develop their powers of introspective observation and to teach them to describe accurately and adequately. Third, to give each individual training in the methods of treating data statistically, and of interpreting and presenting them to readers.

Perhaps somewhere in this list should have been included the purpose of revealing certain of the practical relations of the science of psychology to life, for appeals to the practical will arouse and stir to self-developing effort students who otherwise would not discover either psychology or themselves. But it is important that the teacher emphasize the fact that the experiments are not intended primarily to demonstrate or measure the merit of advertisements.⁴

²A set of five is likely to prove more satisfactory than a set of ten, because of the time requirements of the experiments.

³The writer will gladly supply, at the rate of \$3 per hundred to teachers desiring them, the set of five advertisements which he now employs.

⁴The value of psychological tests for the estimation of the merit of advertisements has been profitably discussed in a recent monograph which should prove of service alike to advertisers and to psychologists. (Strong, E. K., "The Relative Merits of Advertisements," *Archives of Psychology*, 1911, No. 17.)

The experiments with advertisements which have been employed numbered six.⁵ They may be made in class provided a space of at least two square feet on a desk or table is available for each student. The time required is ten to thirty minutes, dependent upon the number of advertisements in the set and the nature of the experiment.

Experiment 1. General Impression Value of Advertisements.

A set of five (or ten) advertisements, numbered at the top from 1 to 5 is delivered in an envelope to each member of the class. Directions are then given to arrange the advertisements in order of diminishing excellence on the basis of a hasty examination of the set, such as one might make in glancing over the pages of a magazine. The procedure should consist in selecting first the advertisement adjudged the best and placing it at the left side of the desk; in selecting second the one adjudged the poorest and placing it at the right side of the desk. Next the second best should be selected and properly placed. Then the second poorest, and so on until the complete set of five, or more has been arranged.

This much having been accomplished, a note-book record of the method, and its results should be made. This may be done by indicating in a vertical column, as in the accompanying table 1, the advertisement (by number), with its place. Briefly and pointedly, the psychological reasons for the given arrangement should be written in the note-book. This should constitute an introspective report of the impression made by each advertisement, and among other things, it should make clear to a reader why a particular order was chosen.

For this experiment the writer has frequently used a set of ten full-page advertisements from the July, 1909, number of the Century Magazine. Each advertisement was trimmed after removal from the magazine and numbered at the top of the page. Ten different articles were advertised, each by the use

⁵Certain of these experiments have been described by the writer in his "Introduction to Psychology." New York: Henry Holt & Co., 1911, pp. 170, 187.

of an illustration and text. The list by number, name, and page in magazine follows:

- No. 1. Clicquot Ginger Ale, p. 73.
- No. 2. Mott's Plumbing, p. 41.
- No. 3. American Telephone, p. 39.
- No. 4. Remington Typewriter, p. 65.
- No. 5. Swift's Ham and Bacon, p. 75.
- No. 6. Shawknit Socks, p. 57.
- No. 7. Gold Medal Flour, p. 2.
- No. 8. Eriesson Engine, p. 33.
- No. 9. Eastman Kodak, p. 51.
- No. 10. Winton Six Automobile, p. 61.

TABLE 1.—Arrangement of Set of Ten Advertisements, According to General Impression Value, Made by Miss C.

Place.	Advertisements.	Comments.
1 (Best)	No. 2.	An effective advertisement; not overdone. Gives information without intrusion of superfluous matter. This advertisement makes by far the strongest appeal to me, and is, I think, the only one of the ten that might influence me to buy.
2	No. 5.	Ingenuous advertisement, with no apparent attempt to mislead. The picture makes so vivid an impression that were I marketing I should remember the basket of hams—but probably should forget they were <i>Swift's</i> .
3	No. 9.	Picture suggests out-of-door pleasures; awakens agreeable associations, and might incline me to think a kodak would be a nice thing to have.
4	No. 1.	Picture of bird or of any animal, except rat or mouse, usually excites my interest. Looking at the eagle, I see what is advertised.
5	No. 6.	Appeals to my liking for comfortable footwear. "Shawknit," however, conveys to my mind no ideas, and the reading of advertisements not being a very exciting entertainment, I should not, ordinarily, look far enough to learn that "Shawknit" means wonderful socks.
6	No. 8.	No special merit, beyond large print and a testimonial (perhaps spurious) from a satisfied customer.
7	No. 10.	Takes too long to reach the point. Before I discover that "Winton Six" is the automobile to buy, I am weary with the history of artificial lighting.
8	No. 3.	Style is inappropriate. Literature, or an account of the nervous system, not called for in a telephone advertisement. Whole thing reflects on one's intelligence and good taste, while it is too obvious that the purpose of the advertisement is to sell the commodity rather than to give accurate information to a prospective purchaser.
9	No. 7.	I have a strong aversion to the use in this way of pictures of men or women. I see no very logical or necessary connection between the faces of women and a brand of flour.
10	No. 4.	The woman obstructs my view of the machine. Advertisement claims too much; I don't believe this is the <i>only</i> typewriter worthy the name.



Clicquot (Pronounced CLICK-O) Club Ginger Ale

For thirsty folk in hot weather there is no beverage so satisfying, refreshing and cooling as Ginger Ale. *Clicquot Club Ginger Ale* is the one that can be depended upon as being perfectly pure and absolutely free of all preservatives. A healthful, delicious drink. Spicy and snappy in flavor and not too sweet. With just enough sparkle to be beneficial and stimulating to the appetite.

IT IS NON-ASTRINGENT AND KEEPS IN ANY CLIMATE

We also make

Birch Beer Sarsaparilla Blood Orange Root Beer Lemon Soda
all of "Clicquot" quality

CLICQUOT CLUB CO.

Millis, Mass., U.S.A.

Of this set of ten advertisements No. 1, adjudged by most individuals one of the poorest of all, and No. 9 adjudged one of the best, are reproduced in the accompanying figures 1 and 2.

The amount of time required for experiment 1 may be reduced by more than one-half by the employment of five instead of ten advertisements; and the task may be somewhat simplified by the selection of advertisements of the same article. A set of five full-page advertisements of Ingersoll watches, of which two are reproduced in figures 3 and 4, has been used with satisfactory results by the writer.⁶ It is difficult to make up such sets from a single number of a magazine, but frequently advertising firms are able and willing to provide them.

At the end of the class-room exercise of experiment 1 records of the arrangements of the advertisements on a single sheet of paper, bearing the student's name, should be collected and handed to some member of the class for statistical study and report to the class.

In working up the results of the experiment the student may be asked to determine:

(1) The distribution of judgments (occurrences of each advertisement in each place). This is given in table 2 for a class of 20 students and the set of 10 advertisements already described.

(2) The average or class arrangement of the advertisements, as contrasted with the several individual arrangements. There are many ways of determining the average arrangement or order, and the student either may be left to his own devices or given a method, with the suggestion that he improve upon it. Table 2 presents the results obtained by a method of weighting. By this method the first place is given a value of 10; the second place, of 9; the third, of 8, and so on. The value attached to a given advertisement by the class is obtained by getting the sum of the value of each place by the number of occurrences in that place. For example, Adv. No. 9, table 2, was given first place by ten members of a class of 20. Since the weight of this place is 10, the value given to the advertisement by its occurrence in the first place is 10×10 , or 100. It

⁶This set also will be supplied to teachers at the rate of \$3 per hundred.



THEY ALL REMEMBERED THE
KODAK

A vacation *without* a Kodak is a vacation wasted. A Kodak doubles the value of every journey and adds to the pleasure, present and future, of every outing. Take a Kodak with you. *Kodaks*, \$5.00 to \$100; *Brownie Cameras*, (*They work like Kodaks*), \$1.00 to \$12.00.

EASTMAN KODAK COMPANY,

*Catalogues free at the
 dealers or by mail.*

ROCHESTER, N. Y., *The Kodak City.*

was given second place by 1 individual; therefore an additional value of 1×9 , or 9. Similarly it was placed in third place by four members of the class ($4 \times 8 = 32$). In the fourth place by 3 ($3 \times 7 = 21$); in the fifth place by 2 ($2 \times 6 = 12$). The sum of these several products of the weight of a given place by the number of occurrences in the place is 174. Had the advertisement been given first place by every member of the class, its value would have been 200. Had it been given last place (tenth) by every member, it would have been 10.

TABLE 2.—*Distribution of Judgments for a Class of Twenty (ten men and ten women) in Experiment 1, General Impression Value. The table gives the number of occurrences of each advertisement in each of the ten places, and the value of each as determined by the method of weighting described on page 6.*

Place.....	1	2	3	4	5	6	7	8	9	10	Value.
Weight.....	10	9	8	7	6	5	4	3	2	1	
Adv. No. 1.....	0	0	1	2	2	1	6	4	3	1	
Value.....	0	0	8	14	12	5	24	12	6	1	82
Adv. No. 2.....	4	7	2	0	2	2	2	0	1	0	
Value.....	40	63	16	0	12	10	8	0	2	0	151
Adv. No. 3.....	1	2	1	3	0	5	3	2	2	1	
Value.....	10	18	8	21	0	25	12	6	4	1	105
Adv. No. 4.....	2	1	4	2	8	1	0	0	0	2	
Value.....	20	9	32	14	48	5	0	0	0	2	130
Adv. No. 5.....	0	3	2	2	0	6	0	4	2	1	
Value.....	0	27	16	14	0	30	0	12	4	1	104
Adv. No. 6.....	2	0	1	1	4	0	1	4	5	2	
Value.....	20	0	8	7	24	0	4	12	10	2	87
Adv. No. 7.....	0	4	2	4	1	3	1	1	2	2	
Value.....	0	36	16	28	6	15	4	3	4	2	114
Adv. No. 8.....	1	1	1	2	0	1	1	1	2	10	
Value.....	10	9	8	14	0	5	4	3	4	10	67
Adv. No. 9.....	10	1	4	3	2	0	0	0	0	0	
Value.....	100	9	32	21	12	0	0	0	0	0	174
Adv. No. 10.....	0	1	2	1	1	1	6	4	3	1	
Value.....	0	9	16	7	6	5	24	12	6	1	86

CLASS, OR AVERAGE, ORDER OR ARRANGEMENT, FROM TABLE 2.

Place.	Adv.	Value.	Place.	Adv.	Value.
1	No. 9	174	6	No. 5	104
2	No. 2	151	7	No. 6	87
3	No. 4	130	8	No. 10	86
4	No. 7	114	9	No. 1	82
5	No. 3	105	10	No. 8	67

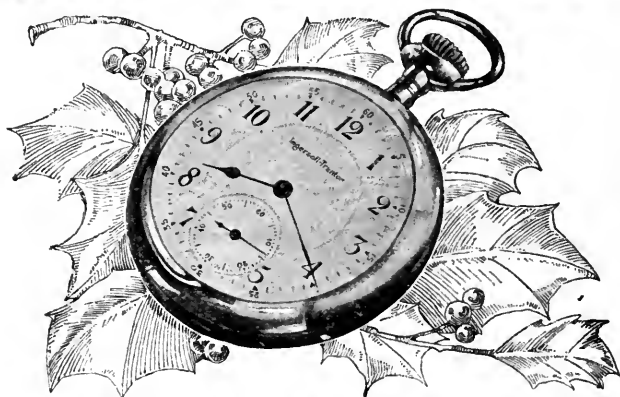
(3) The number of departures of the several individual arrangements from the class, or average, arrangement. This may be obtained by comparing each individual arrangement with the average arrangement, noting and taking the sum of the points of disagreement. From table 1 it appears that Miss C. arranged the ten advertisements, according to impression value, from best to poorest as follows: Nos. 2-5-9-1-6-8-10-3-7-4. The average or class order as it is given at the bottom of table 2 reads: Nos. 9-2-4-7-3-5-6-10-1-8. In no instance does Miss C.'s judgment agree with the average. Whereas she placed No. 2 first, the class placed it second. Her judgment may therefore be said to differ from the average by 1 point. She placed No. 5 second, and the class placed it sixth. The departure from the average is 4 points. Comparison of the ten individual judgments with the ten average values gives as the total number of departures from the class order, in the case of Miss C., 34. Another member of the class diverged from the average by only 12 points.

(4) The above statistical results may later, and by another member of the class, be correlated with the introspective reports and with the psychological traits of the members of the class.

Throughout the work it is essential that the instructor emphasize the importance of attending to the psychological phenomena exhibited rather than to the so-called objective values of the advertisements. For the purpose of the experiment is to facilitate introspection, not to reveal or measure the relative values of a number of advertisements.

The writer is in the habit of following experiment 1, either immediately or at intervals determined by the progress of the lectures, by five other experiments which provide for a detailed psychological analysis of the consciousness of the advertisements. Experiment 1, on the general impression value of the materials, serves as a starting point and provides material of interest for comparison with the results of experiments 2 to 6.

The remaining experiments may be described briefly, for they demand procedures very similar to that of experiment 1.



For a Man's Christmas

Is there anything that so delights a man's heart as a fine watch—one that permits him to speak the time with authority? It is dainty and beautiful, as a gift should be, and besides is his most personal and useful possession. For years he carries it wherever he goes. But his satisfaction depends upon it being an exact timer. Among watches there is one, though moderate priced, which has come to be conspicuous for its close timing—accurate as only high-priced watches have been.

The Superior Watch

Ingersoll-Trenton

7 and 15 Jewel Models

\$5 to \$15

No handsomer watch has ever been made. It will keep time for a generation. Your home jeweler can sell you an Ingersoll-Trenton and he will stand behind it. It is sold at our advertised prices by all who handle it and our price ticket is on each watch.

Go to your own jeweler's and examine it before buying any watch. If, by chance, he hasn't the I.T., we will gladly send the name of one nearby who has. Our booklet, "How to Judge a Watch," is the best explanation of a watch ever written, and is free on request. The \$5 Ingersoll-Trenton has 7 genuine jewels and is in a solid nickel case. The \$15 Ingersoll-Trenton has 15 jewels and is in a 25 year guaranteed gold-filled case of the highest quality. Equally accurate models in a variety of I.T. cases at \$7, \$8, \$9, \$10 and \$12.

Robt. H. Ingersoll and Bro.

85 Frankel Bldg., New York

FIG. 3.—Advertisement No. 3 in Ingersoll Watch set. One of the best in the set.

They deal respectively with attention, perception, feeling, judgment, and memory values.

Experiment 2. Attention Value of Advertisements. The class is directed to arrange the advertisements according to their power to "catch and hold attention." Here, again, introspection should be insisted upon, and it should be made to reveal the essential facts of attention. The advertisements should serve merely as means to this psychological end.

Statistically the results of the attention experiment may be dealt with as were those of the impression experiment. Class discussions of the introspections are very important aids.

Experiment 3. Perception Value of Advertisements. In this experiment the class is required to arrange the set in accordance with degree of definiteness, completeness and intelligibility of the consciousness induced by each advertisement. Many advertisements of high attention value possess low perception value because they do not induce definite, practically complete and intelligible perceptions. They leave in consciousness a more or less unintelligible fragment of information.

Experiment 4. Feeling Value of Advertisements. The materials are to be considered from the point of view of agreeableness. That advertisement which produces the most pleasing effect belongs first; that which produces the least pleasing effect belongs last.

Experiment 5. Judgment Value of Advertisements. The arrangement, in this exercise, should be made in accordance with the convincingness of the materials. Illustration, text and general make-up should be carefully considered. The introspection of the reasoning (thought) processes is especially important.

Experiment 6. Memory Value of Advertisements. Completeness and accuracy of recall constitute the basis of arrangement. The experiment, in satisfactory performance, demands a somewhat different procedure from that of the others. The writer has followed the method of permitting an interval of one or two weeks to elapse, without consideration of the advertisements by the class, and of then setting, as a class-exercise, the task of writing all that can be recalled, within the lim-

"Let Me See One of Those Ingersoll-Trenton Watches!"

JEWELERS throughout the United States are having this said to them across their show-cases by thousands of discriminating watch-buyers, who demand the best watch for the least money. "INGERSOLL-TRENTON!" is the watch-word of the hour.

The *feel* of a fine watch in your pocket is like the feel of a good coat on your back—it gives you a sort of manful confidence in yourself, and when you take your watch out "to see what time it is" it gives others confidence in you, for a good watch is a badge of thrift. It also indicates the personal trait of punctuality, which goes far to compel business success.

The Ingersoll-Trenton watch is a dignified, dependable and durable timepiece. It is finely jeweled and beautifully cased. It is a credit to the person who carries it, being a watch of quality and worth.

And yet you do not have to "give up" a lot of money to own an Ingersoll-Trenton. \$5, \$7 and \$9, in nickel, 10-year gold-filled or 20-year gold-filled cases—*these are the prices* at which we are able to offer these strictly high-grade watches, timed to the minute and fit for the most critical user. No other watchmaker can sell a watch of similar quality at these prices.

Therefore, go to your jeweler and say to him the words at the top of this page.

We also make Ingersoll models at \$1, \$1.50 and \$2. 12,000 of them are sold daily, "as time goes on."

Our illustrated fact-book about watchmaking will open your eyes and save you money. Send for a copy. Read it yourself and loan it to your neighbors. It is a good book to have and read and lend.

ROBT. H. INGERSOLL & BRO., 000 Frankel Building
New York

A WATCH THAT IS BETTER THAN ITS ADVERTISING

"I have carried my Ingersoll-Trenton one year. It keeps better time than your advertisement said it would. It is absolutely the best watch I have ever seen."

R. T. Chappell,
Kaufman,
Texas.



You can get an Ingersoll-Trenton in any one of 7,000 leading jewelry shops throughout the United States.

RESOLVED

That it isn't necessary for me to pay a big price for an accurate watch when I can get an accurate Ingersoll-Trenton for five, seven or nine dollars.

FIG. 4.—Advertisement No. 2 in the Ingersoll Watch set. One of the poorest in the set.

ited time specified, concerning four aspects of each advertisement.

In this exercise each advertisement is designated, in turn, by the instructor, by its number and a key word. For instance, No. 1, ale; No. 2, plumbing; No. 3, telephone. The directions given are: Recall as accurately and completely as you can, and record the following groups of facts concerning the advertisements.

(1) The exact name of goods and firm. (Time limited to 1 minute.)

(2) Address or source of information or supply. (Time limited to 1 minute.)

(3) Chief points of illustration. (Time limited to 2 minutes.)

(4) Chief points of text. (Time limited to 2 minutes.)

Out of class, the collected results may be evaluated by a member of the class and the rank of each advertisement for the individual, as well as for the class, determined.

Any or all of the detailed analysis experiments, Nos. 2 to 6, may be made either by the method described on page 3, or by the method of systematic comparison now to be described. The latter method is recommended especially for experiment 4, feeling value.

For the method of systematic comparison each student should be provided with a record blank like that which appears, filled in, in table 3.⁷ The instructor should briefly explain the experiment by stating that he will, in turn, display each advertisement with each other for an interval of five seconds, at the same time asking the members of the class to decide which one of each pair is the more agreeable, and to record their judgments immediately on the record sheet.

The experimental procedure consists in displaying conspicuously each advertisement, as a "standard," with each of the others as "compared" advertisement. For the judgments which are recorded in the upper half of the blank the "standard" should always be placed on the right of the observer;

⁷These blanks will be supplied to teachers who desire them at the rate of 50 cents per hundred. Orders should state whether the blanks are to be used with sets of five or of ten advertisements, since both five and ten-place blanks are available.

for those of the second half of the blank, it should be on the left. Beginning with No. 1 as the "standard," the instructor should expose it to view for five seconds (not longer) beside No. 2, as the "compared" advertisement, at the same time asking "Is No. 1 more agreeable or less agreeable than No. 2?"

The judgment "more agreeable" may be conveniently indicated in the table by a plus sign (+); the judgment "less agreeable," by a minus sign (—).

In like manner, and in rapid succession, No. 1 should be displayed with each of the other advertisements, then No. 2 should be substituted for No. 1, as the "standard," and displayed in turn with each of the others.

After the upper half of the record sheet has been filled in, it should be hidden from view by being folded under the lower half, and the experiment should be continued with the position of the "standard" changed from the right of the observer to the left. All other conditions of the experiment should remain unchanged.

Table 3 shows the form of the record sheet and it also presents a typical series of judgments. In this experiment Subject A, of table 3, judged No. 1 when compared with No. 2 as the less agreeable (—); when compared with No. 3, as the more agreeable (+), and so on.

At the conclusion of the experiments the record sheets may be collected and delivered to a member of the class for statistical study and report. Each member of the class should write a full introspective report of the experiment. In order that these reports may be fairly detailed and accurate, it is necessary to limit the number of objects to be compared to five or less. A set of ten advertisements, or other objects, requires too large a number of judgments.

The feeling value of an advertisement is measured, in this experiment, by the number of cases in which it is judged to be the more agreeable. Thus, in the series of comparisons recorded in table 3, each advertisement appears 36 times as a member of a pair, and there are, consequently, 36 judgments concerning its agreeableness. Subject A gave the maximum number of favorable judgments (36) in the case of advertisement No. 2, and the minimum number (0) in the case of advertisement No. 6.

TABLE 3.—*Judgments Obtained by the Comparison of Each of Ten Advertisements with Every Other, with Respect to Agreeableness (Feeling Value). The Resulting Order of Agreeableness Appears at the Bottom of the Table.*

Experiments with Advertisements. Name—Subject A (Woman). Date—October 20, 1911. Topic—Feeling Value of Advertisements.

"STANDARD" ADVERTISEMENT ON RIGHT OF OBSERVER.

No. of Adv.	1	2	3	4	5	6	7	8	9	10	Totals (+)	Sums of Totals
1.....		-	+	+	-	+	-	+	-	+	5	10
2.....	+		+	+	+	+	+	+	+	+	9	18
3.....	-	-		-	-	+	-	+	-	+	3	6
4.....	-	-	+		-	+	-	+	-	+	4	8
5.....	+	-	+	+		+	+	+	-	+	7	14
6.....	-	-	-	-	-		-	-	-	-	0	0
7.....	+	-	+	+	-	+		+	-	+	6	12
8.....	-	-	-	-	-	+	-		-	-	1	2
9.....	+	-	+	+	+	+	+	+		+	8	16
10.....	-	-	-	-	-	+	-	+	-		2	4
Totals (-)	5	9	3	4	7	0	6	1	8	2		90

"STANDARD" ADVERTISEMENT ON LEFT OF OBSERVER.

No. of Adv.	1	2	3	4	5	6	7	8	9	10	Totals (+)	Sums of Totals
1.....		-	+	+	-	+	-	+	-	+	5	10
2.....	+		+	+	+	+	+	+	+	+	9	18
3.....	-	-		+	-	+	-	+	-	+	4	6
4.....	-	-	+		-	+	-	+	-	+	4	6
5.....	+	-	+	+		+	+	+	-	+	7	15
6.....	-	-	-	-	-		-	-	-	-	0	0
7.....	+	-	+	+	-	+		+	-	+	6	12
8.....	-	-	-	-	-	+	-		-	-	1	2
9.....	+	-	+	+	-	+	+	+		+	7	15
10.....	-	-	+	+	-	+	-	+	-		4	6
Totals (-)	5	9	2	2	8	0	6	1	8	2		90

GENERAL RESULTS.

No. of Advertisement.....	1	2	3	4	5	6	7	8	9	10
No. of Judg. in favor.....	20	36	12	14	29	0	24	4	31	10
Order of merit.....	5	1	7	6	3	10	4	9	2	8

Following the table appears the number of judgments in favor of each advertisement, and the arrangement of the set of advertisements in order of diminishing feeling value for Subject A.

The employment of the systematic comparison method in experiment 4 has the advantage of introducing novelty of procedure, of yielding results which are likely to be more reliable than those obtained by means of the "better-worse method" described on page 3, and of permitting comparison of the results of the two methods, in case the instructor finds opportunity to repeat the experiment.

Upon the completion of the six experiments and the filing of the reports by those members of the class selected to make special study of the materials, the instructor may assign to some student the task of determining from the several special reports, the class or average order of the advertisements which results from the combining of the arrangements of experiments 2 to 6. This is readily done by adding the values given to each advertisement in the five experiments. Finally, the class order as obtained in the first, or general impression value, experiment should be compared with the order yielded by the detailed study of the set of advertisements made in experiments 2 to 6.

Throughout these, and similar class experiments, it is necessary that the instructor insist upon faithful introspection, allow much time for the presentation and discussion of introspective reports, and constantly make use of opportunities to illustrate the facts and laws of mental life. The instructor necessarily is a more important factor in the success of such experiments than is the advertisement.

It has been the writer's purpose in this paper to describe briefly certain experimental procedures in class work, not to present the results of the experiments which he has made with his classes. The opportunity is accepted, however, to present the general statistical result of the "impression value" and "detailed analysis" experiments as carried out with three classes, with the same materials and practically identical procedures. The agreement in the three arrangements as given in tables 4 and 5 is marked.

TABLE 4.—*Order of Excellence of Set of Ten Advertisements as Given by the General Impression Value Experiment for Three Classes.*

Class 1.		Class 2.		Class 3.	
7 Women.	13 Men.	10 Women.	10 Men.	15 Women.	10 Men.
Advertisement.	Value.	Advertisement.	Value.	Advertisement.	Value.
No. 4	151	No. 9	174	No. 9	201
" 2	147	" 2	151	" 4	181
" 7	146	" 4	130	" 2	178
" 9	138	" 7	114	" 7	168
" 5	125	" 3	105	" 5	154
" 3	118	" 5	104	" 3	152
" 1	93	" 6	87	" 1	110
" 10	71	" 10	86	" 10	109
" 6	59	" 1	82	" 6	73
" 8	52	" 8	67	" 8	49

TABLE 5.—*Order of Excellence of Set of Ten Advertisements as Given by the Averaging of the Arrangements Secured in the Experiments on Attention, Perception, Feeling, Judgment and Memory for the Three Classes of Table 4. The Data of Tables 4 and 5 Are Strictly Comparable.*

Class 1.		Class 2.		Class 3.	
7 Women.	13 Men.	10 Women.	10 Men.	15 Women.	10 Men.
Advertisement.	Value.	Advertisement.	Value.	Advertisement.	Value.
No. 4	170	No. 9	158	No. 9	220
" 9	149	" 4	135	" 7	186
" 7	148+	" 2	132	" 2	179
" 2	148	" 7	118	" 4	176
" 5	135	" 5	117	" 5	171
" 3	124	" 3	113	" 3	142
" 1	83	" 10	98	" 10	126
" 6	73	" 6	83	" 1	124
" 10	69	" 1	77	" 6	119
" 8	58	" 8	60	" 8	82

MENTAL FATIGUE IN DAY SCHOOL CHILDREN AS MEASURED BY IMMEDIATE MEMORY. PART I.

W. H. WINCH.

London, England.

SUMMARY.

The chief defect in the measurement of mental fatigue in children by tests of immediate memory has been the irregularity and variation in intellectual work in the early part of a series of new exercises. In the present investigation practice was continued until the pupils' performance became "steady," before the fatigue tests were begun. Tests with a class of forty-five boys, averaging thirteen years of age, showed a relative inefficiency in the work of the late afternoon as compared with that of the early morning. The reduction in efficiency amounted to five or six per cent.

THE PROBLEM STATED.

Most of us who are adults are fairly certain, in so far as we can be from introspective evidence, that when we are weary our memories are apt to play us false. We feel, too, when we are tired, that we need to make more effort to remember, and we reproduce what we know more hesitatingly as well as more ineffectively. Especially do we find a difficulty in remembering non-connnotative and unrelated names; and our language would probably be more vigorous than rational if, whilst feeling fatigued, we were asked to learn by rote, for purely experimental purposes, a number of meaningless symbols. I need not labor these points; they are probably within the personal experience of every one of us. These considerations induced me to make one more attempt to measure fatigue in children by means of tests in memory; but with no great hope of success, for when we turn to the work of those who have experimented much with children, we find a practical unanimity of opinion that immediate memory tests will not give satisfactory

indices of fatigue.* Why should tests which appear *prima facie* to adults as specially likely to give indications even of small degrees of fatigue fail so hopelessly to indicate fatigue in children? One factor is doubtless the comparative immunity of the child to mental fatigue of a mechanical kind, but probably the most potent factors in the failure of these tests are the irregularities and variations to which intellectual work of this mechanical kind is subject, especially in the first few of a continued series of new exercises. If we could postpone the fatigue tests until the work of the children had become "steady" for that particular sort of exercise, more satisfactory results, I thought, might possibly be obtained. By "steady" I mean that the children in the group do not change places much from test to test. Expressed mathematically "steady" means that there are high positive correlations between the successive tests of the series. I do not mean that each child ceases to improve and henceforward oscillates about a mean which may be regarded definitely as normal work for the particular child. For improvement by practice is the rule and to stand still or retrogress is exceptional. And the practice effects are mingled with the fatigue effects. Thus an immediate memory test on, say, Tuesday morning, may give a lower result than a second one on the following Tuesday afternoon. Are we to conclude that Tuesday afternoon is a better time for memorizing than Tuesday morning? Not unless we find the afternoon results superior *after eliminating the practice effect*, that is the improvement by practice resulting from the work of the previous exercise. I have endeavored to do this by working with two groups, initially equal, and equally practiced. When the work in immediate memory has become steady, I have divided the children who were working the exercises into two equal groups. Then one of the groups has worked further tests in the mornings only, whilst the other group has worked the same tests late in the afternoons. A comparison between the morning results and the afternoon results may indicate the comparative freshness or fatigue of the two groups in the mornings and afternoons respectively.

*"On this point we have the unanimous verdict of Bolton, Ebbinghaus, Schuyten and Smedley." Whipple's *Manual of Mental and Physical Tests*, p. 385.

II. A FIRST EXPERIMENT IN A BOYS' SCHOOL.

The work was done with the whole of a Standard VI class, numbering 45, of an average age of 13 years, 0 months, on July 31, 1910, in a municipal boys' school situated in a rather poor neighborhood in London. The teacher of the class was a young man of much capacity, enthusiasm and energy; the school, as a whole, was strongly disciplined and the children worked hard.

In such a class it is probable that the boys, except in the intervals for recreation, give their attention to their school work for practically the whole of the school day. In cases like this it should not be hard to find some considerable differences between the best morning work and the worst afternoon work. It is true that the tests of immediate memory in which I am going to make such a comparison are of a mechanical nature, but it must not be forgotten that they are always of new material: the process can be mechanized, but the acquisition required is always a new matter.

i. *Tests and Method of Marking.*

The tests were for memory of visual percepts. Twelve consonants, arranged in the following way:

t	v	d	m
y	f	x	r
b	s	n	c

were exposed to view for 25 seconds, after which the boys wrote down as much as they could remember; 1 minute 35 seconds being allowed for writing and rest. At the end of 2 minutes a second test was given; then, similarly, a third, and so on. Ten tests were given on each occasion, so that the whole exercise lasted just 20 minutes. The boys were required to study the tests visually, audible articulation not being permitted. They were told to let their attention pass from left to right commencing with the top line, and then to the second and third lines, passing through the whole test before beginning a second repetition of any part of it. Three marks were given for each consonant correctly remembered and rightly placed; two, if it were "one place" before or behind its proper position; and

one, if it were "two places" out. It was found helpful to instruct the children to leave a space in the place of any consonant which they *knew they had forgotten*.

ii. *Chronology of the Series.*

Eight sets of preliminary tests were given to afford a basis for the division of the class into two equal groups.

On Wednesday, March 16, 1910, at 9.45 A. M., the first set of tests was given, following immediately upon a Scripture lesson. All the morning tests were given on Wednesdays at the same time, and likewise following immediately after Scripture lessons.

On Friday, March 18, at 4 P. M., a second set of tests was given, following immediately upon a grammar lesson in which the boys are required in this school to do some rather hard thinking. All the Friday tests were begun at 4 P. M. The school periods on Friday afternoons preceding the grammar lesson were occupied with spelling, physical drill, history, recreation.

On Wednesday morning, March 23, a third set of tests was given. The Easter holidays then intervened, but the work was resumed afterwards.

On Friday, April 8; Wednesday, April 13; Friday, April 15; Wednesday, April 20, and Friday, April 22, a fourth, fifth, sixth, seventh and eighth set of tests were given respectively.

On the results of the fifth, sixth, seventh and eighth tests the class was divided into two equal groups.

Henceforward, one of the two groups—Group A—worked memory tests in the morning only, and the other—Group B—worked in the afternoon only. The morning group worked them on Wednesday mornings from 9.45 to 10.05, immediately after a Scripture lesson; the afternoon group on Wednesday afternoons from 4 to 4.20 P. M. The preceding afternoon lessons were spelling and physical drill, recreation and algebra.

It was evident after the first fatigue test that the morning group did better work with the same test than the afternoon group; but it was thought well to continue the tests on succeeding Wednesdays to see if the same relationship was maintained

subsequently. Three fatigue tests were therefore given on April 27, May 4 and May 11, respectively, to Group A in the mornings and to Group B in the afternoons.

iii. *Results.*

It is not intended to lay any stress on the results of the first, second, third and fourth preliminary tests, nor were the "coefficients of reliability" between them calculated in a rigorous way. It was obvious from an inspection of the figures that the children had not yet taken up a very steady position relative to one another; they had not quite settled down to what, in matters of sport, we should call their "true form." But the fifth preliminary test was correlated with the sixth. Working from the individual cases by the Pearson product-moment formula

$r = \frac{\sum xy}{n\sigma_1\sigma_2}$, "r" was found to be + .901, with a "probable error" of .02.

The results of the sixth were correlated with those of the seventh, and "r" was found to be + .874, and the correlation between the results of the seventh and eighth was found to be + .884, with "probable errors" also approximating to .02.

I had now great hopes, if I divided the class into two equal groups on the results of these four sets of tests which correlated so highly, that I should obtain two groups which would be obviously sensitive to variations in the conditions as to freshness and fatigue with which the work was done. Two boys had 'left school' during the tests and one boy was omitted because he could not be paired.

The actual results of tests 5, 6, 7 and 8 were as follows:

Test 5.	Average mark	237.6.	M. V.	30.7.
" 6.	"	" 234.6.	"	30.3.
" 7.	"	" 239.7.	"	30.7.
" 8.	"	" 251.5.	"	34.4.

Tests 5 and 7, will be remembered, were Wednesday morning tests, and tests 6 and 8 were Friday afternoon tests.

Two equal groups were then formed on the results of these four tests cited above; 21 boys were placed in each group and the groups were subdivided into sections, thus.

TABLE I, *Showing the Division Into Two Equal Groups.*

Av. marks per test in preliminary tests.	Group A.			Group B.		
	No. of boys.	Av. mark per boy per test in four prelim'y tests.	M. V.	No. of boys.	Av. mark per boy per test in four prelim'y tests.	M. V.
Over 280	4	300.2	11.9	4	298.7	15.7
240 to 280	5	256.7	10.1	5	259.1	9.5
200 to 240	9	222.5	9.8	9	222.4	9.4
160 to 200	3	189.9	8.0	3	188.8	8.4

Taking Group A and Group B as wholes, the former had an average mark in these four preliminary tests of 240.9 (mean variation 30.2), and the latter average mark of 240.9 (mean variation 30.6).

It now remains to present the results of the work of these two groups when Group A continued the tests in the mornings only and Group B continued them in the afternoons only.

I present at first the results in gross.

TABLE II, *Showing the Comparative Results of Groups A and B in the Morning and Afternoon Work, Respectively.*

Date.	Group A—(Morning).			Group B—(Afternoon).		
	Total marks.	Av. mark per boy.	M. V.	Total marks.	Av. mark per boy.	M. V.
27/4/10.	5375	256.0	40.1	5172	246.3	36.9
4/5/10.	5631	268.1	33.3	5283	251.6	40.4
11/5/10.	5812	276.8	32.5	5548	264.2	37.1

In the first week the morning group improved on its record in the preliminary tests to the extent of 6.26 per cent., calculated as a percentage on the average of the four preliminary tests; in the second week 11.3 per cent., and in the third week 14.9 per cent.; whilst the afternoon group improved on its preliminary record in the first week 2.2 per cent., in the second week 4.4 per cent., and in the third week 9.6 per cent. It seems clear that, though improvement by practice is still obvious in both groups, Group A is improving faster than Group B. The difference is taken as a measure of the difference in mental energy for this sort of work at 9.45 in the morning and 4 in the afternoon of a mid-week day, after the lessons specified in the chronological account of the experiment. On the assumption that both groups would have shown approximately equal practice effects had they continued the work under equal conditions, the decreased improvement in the results of the afternoon work as compared with the morning work is regarded as a measure

of fatigue. But it remains to be shown whether this relationship holds for the corresponding sections into which the groups are divided.

TABLE III, *Showing the Comparative Results of Groups A and B, Section by Section.*

Av. mark in pre- liminary tests.	No. of boys.	Group A.—Fatigue tests.			No. of boys.	Group B.—Fatigue tests.		
		1st.	2d.	3d.		1st.	2d.	3d.
Over 280	4	319.5	323.5	325.2	4	329.2	335.0	344.0
" 240	5	284.8	283.4	294.2	5	247.2	259.0	272.4
" 200	9	230.1	249.3	259.5	9	225.8	221.8	235.9
" 160	3	200.7	225.3	234.7	3	195.7	217.3	229.0

Improvement is obviously the rule, as the averages of the whole group seemed to show. But the division of the groups into sections indicates that the afternoon workers in every section but the best do worse work in the afternoon than the corresponding sections in the morning. The general falling off of the afternoon workers is, of course, a result which might have been expected; but I was not prepared to find that *any* section of school boys of this age and mental level would do *better* work in the afternoon than another corresponding section would do in the morning. This result is not due to some astonishing and quite abnormal work on the part of one individual, for every boy in this section of the afternoon group has beaten the corresponding boy in the corresponding section of the morning group. May it be that the children strongly endowed in the natural function tested show rather the stimulating effect of the day's school work than its fatiguing effect? I append the figures:

TABLE IV, *Showing the Individual Work of the Top Four Boys in Groups A and B Compared.*

First Section—Group A.			First Section—Group B.		
Name. (Initials only.)	Av. mark four prelim'y tests.	Av. mark three final tests.	Name. (Initials only.)	Av. mark four prelim'y tests.	Av. mark three final tests.
E. L.....	320	333	C. M.....	326	347
H. W.....	304	320	A. S.....	302	344
L. A.....	296	311	W. B.....	284	319
C. A.....	281	326	H. B.....	282	334

After those of the top sections, however, the results for the afternoon work as compared with the morning work tend steadily downwards, and in no other *section* does the work of the afternoon group excel that of the corresponding *section*

which works in the morning. But there are individual pupils lower down in Group B who reach higher results in the afternoon work than corresponding pupils in Group A—the morning group—so that the suggestion made above to account for the superiority of the upper section of the afternoon workers at once appears doubtful. I propose, finally, to show the comparative improvements of the individual pupils in Group A and Group B in the morning and afternoon work respectively. The improvements are calculated on the average of the four preliminary tests on which the class was divided. The averages and percentages are calculated to the nearest unit only.

TABLE V, *Showing the Comparative Improvement of the Pupils in Groups A and B in the Morning and Afternoon Work, Respectively.*

Group A.				Group B.			
Name. (Initials only.)	Av. of four prelim'y tests.	Av. of three final tests.	Percentage of im- provement.	Name. (Initials only.)	Av. of four prelim'y tests.	Av. of three final tests.	Percentage of im- provement.
L. F.	321	333	+ 4	N. C.	327	347	+ 6
W. H.	304	320	+ 5	S. A.	302	344	+ 14
A. L.	296	311	+ 5	B. W.	284	319	+ 12
A. C.	281	326	+ 16	B. H.	282	334	+ 18
S. J.	274	333	+ 22	W. W.	278	283	+ 2
B. W.	265	297	+ 12	M. R.	262	264	+ 1
M. V.	257	286	+ 11	A. W.	261	259	— 1
D. S.	245	234	— 4	C. W.	249	235	— 6
A. H.	243	287	+ 18	L. W.	245	257	+ 5
W. V.	238	264	+ 11	M. C.	237	256	+ 8
I. W.	233	244	+ 5	K. H.	234	251	+ 7
D. C.	231	271	+ 17	W. W.	229	221	— 3
H. F.	229	255	+ 11	F. T.	229	246	+ 7
A. H.	227	238	+ 5	K. G.	225	253	+ 12
B. W.	220	232	+ 5	P. G.	223	237	+ 6
S. C.	219	244	+ 11	O. G.	217	213	— 2
A. F.	205	238	+ 16	C. G.	207	184	— 11
F. W.	202	231	+ 14	C. J.	202	189	— 6
W. H.	196	222	+ 13	K. F.	197	223	+ 13
H. H.	196	219	+ 12	P. T.	194	199	+ 3
J. A.	178	219	+ 23	B. A.	176	219	+ 24
<hr/>				<hr/>			
	5060	5304			5060	5333	
Averages.	240.9	266.7		Averages.	240.9	253.0	
M. V.	30.2	34.5		M. V.	30.6	35.9	

On inspection of the above table we find in the morning group 1 case only in which a positive improvement is not shown; in the afternoon group there are 6 cases. In the morning group there are 2 cases showing an improvement of 20 per cent. and over as compared with 1 case in the afternoon group;

there are four cases which show an improvement of 15 to 20 per cent. as against 1 case in the afternoon work; there are 8 cases between 10 and 15 per cent. as against 4 cases in the afternoon group; there are 5 cases which show an improvement between 5 and 10 per cent., as compared with 6 in the afternoon group; and there is 1 case between 0 and 5 per cent., as compared with 3 in Group B. These results are more clearly exhibited in the following table:

TABLE VI, *Showing the Comparative Percentages of Improvement Between the Members of Group A and Those of Group B.*

	Number of Cases.	
	Group A. Morning Group.	Group B. Afternoon Group.
Gain of 20% and over.....	2	1
Gain of 15% to 20%.....	4	1
Gain of 10% to 15%.....	8	4
Gain of 5% to 10%.....	5	6
Gain of 0% to 5%.....	1	3
Loss of 0% to 5%.....	1	3
Loss of 5% to 10%.....	0	2
Loss of 10% and over.....	0	1

The correlation of the results of the four preliminary tests between the corresponding cases of the two groups, A and B, worked out by means of rank formulæ, is, of course, positive 1. In the work of the final tests the A group series correlates with the B group series to the extent of + .87. This estimation was made by means of the Pearson rank formula

$$\rho = 1 - \frac{\sum d^2}{n(n^2-1)}$$

If we are entitled to suppose that Group B, if it had worked in the mornings, would have made as much improvement as Group A we can regard the extent to which it failed to do so as a fatigue effect. The "morning group" improves 10.7 per cent. from the preliminary to the final tests; whilst the "afternoon group" improves 5.0 per cent. from the preliminary to the final tests. For a class of boys of this age and mental level therefore, the fatigue effect thus calculated appears to be between 5 and 6 per cent. These results are not exposed to the dangers arising from the effects of novelty. Every boy whose work is here shown has worked no less than 110 memory tests

in 11 sets, spread over a period of some 8 weeks. A more serious difficulty—one which specially attacks long series—is that of boredom. I am not quite sure whether boredom may not be very closely related to fatigue for a particular function, especially if it be one in which we were formerly interested and in which we showed improvement. But assuming for the present that it is not, namely, that we *can* work without “objective fatigue,” though the work bores us, will the assumption of boredom affect the conclusion drawn as to fatigue? I think not; unless we believe that the morning groups and afternoon groups are likely to be affected by this factor to a different extent.

III. SUMMARIZED CONCLUSIONS.

1. The use of immediate memory tests shows, in a normal group of school children constituting the whole of a class or grade, a certain amount of relative inefficiency in the late afternoon as compared with early morning work. This relative inefficiency is taken as a measure of fatigue. For children at this age and mental status it does not appear to be great for work of this kind, and is probably about 5 or 6 per cent.

2. One of the pupils in the morning group and six of the pupils in the afternoon group cease to improve, begin to oscillate in their work, and tend on the whole downwards. If this is not due to boredom (I have argued previously that it is not likely to be) it is an indication that these pupils are being generally overworked, or have reached their saturation point for the function in question. With about one-third of Group B the work done late in the afternoon has been futile.

. As a pedagogical conclusion, we might accept the following dictum: Wherever, under first-rate teachers and with earnest work on the part of the children, a series of exercises begins to produce a steady decline in improvement, it is an indication to us of the advisability of lightening the general work or of a cessation of those exercises, at least temporarily, until the children's reparative activities have had time to produce their proper effect. If this dictum be accepted it could be applied to discover the best age and time for starting new sub-

jects and parts of subjects in the school curriculum. For example, when should a child begin problematic arithmetic? I suggest when, with earnest work and first-rate teaching, improvement is shown generally from exercise to exercise, and not otherwise. Such a criterion would also serve to regulate the adjustment of the intervals between the successive lessons.

(Part II will appear in the February number.)

PROBLEMS IN THE EXPERIMENTAL PEDAGOGY OF ELEMENTARY AGRICULTURE.

GARLAND A. BRICKER.

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Elementary agriculture as a school subject is so young that one of the most difficult problems confronts us when we undertake to define its field. Both the content and the place in the program of studies of a school subject should be known before the formulation of its pedagogy is attempted. The first problem, then, in teaching elementary agriculture is to determine what portions—facts, principles, laws, and their applications—of this great subject may, with profit to the child and the race, be taught in the elementary school.

The time was, less than a century ago, when practically no science of agriculture existed, although the art of agriculture is perhaps the most ancient. In America, the passage of the Morrill Act by Congress in 1862 laid the foundation for the building of a great science of agriculture; and through the application of its principles to the production of food, clothing and shelter for man, or to the satisfying of his esthetic desires, the most ancient art of agriculture has been transformed. When these land-grant colleges began their work, many of the things which they taught were quite elementary. As agricultural investigations bore fruit, and new discoveries were formulated into principles, the body of subject matter gradually grew until there came to be a great mass of agricultural information that was available for teaching. With the rise of the agricultural high schools, and the introduction of the subject of agriculture into the regular American secondary school, at the beginning of the present century, much of the agricultural information that was considered elementary and secondary was handed over to these new schools and courses for instructional purposes. Now, as the elementary and rural schools of

the country are beginning to teach agriculture, a new division of the subject matter is being made, and certain phases of agriculture on the one hand and of nature study on the other, are being formulated for use in elementary instruction. Just what these phases should be has not yet been definitely settled. However, a beginning is being made, and a few elemental and fundamental facts, principles, laws, and practices of agriculture are coming to be generally used. This instructional matter must meet at least three requirements: on the side of the home, the instruction should result in some immediate economic benefit, and in giving the boy an intelligent desire for farm life; from the side of the school, the boy should be prepared for continuing the agricultural work of the high school; and from the standpoint of the pupil himself, the matter of instruction should be adapted to his nature and capacity. To ignore any of these factors, must, at the present time, result disastrously to any portion of the subject the presence of which may be desired in the elementary or rural schools.

The National Education Association Committee on Industrial Education in Schools for Rural Communities recommended in 1905 that agriculture be taught in the upper grammar grades, indicating especially the seventh and eighth grades, and possibly the sixth grade also.¹ The wisdom of this recommendation is becoming more apparent as the years pass by. Yet, attempts are being made in some quarters to introduce the teaching of elementary agriculture into all the grades of the elementary school. There is a possibility that such a procedure will be justified; the probability of its eventually succeeding is, however, seriously questioned, the error arising from the neglect to differentiate between agricultural nature-study and elementary agriculture.

A very comprehensive problem is the matter of determining by experimental methods whether or not the principles of our present-day pedagogy, which have been evolved through the medium of the older school subjects, hold equally true when applied to this new field of semi-vocational-cultural training. If some modifications are necessary, just what are they and how shall they be accomplished?

¹See the "Report of the Committee on Industrial Education in Schools for Rural Communities" of the National Educational Association, pp. 44-46.

The teaching of agriculture is largely a synthetic process, instead of analytic. We teach how to raise corn instead of teaching how it was raised. There are those who insist that the pupil should first go through the experience of certain agricultural operations before he be given the opportunity of studying the scientific aspect of these methods. He must raise some corn before studying its culture. The claim is that the pupil should first have the experience of applied science, so that when he shall later study the scientific principles involved, he shall understand their significance more fully. This method would be the applied science approach carried to the extreme. On the other hand, it is argued that the methods of agriculture—the raising of corn, for example—which are taught to elementary school pupils should be only such as have been thoroughly tested by practical agriculturists. It is, therefore, not essential that the pupil shall first raise a plot of corn before he shall study about the raising of corn. If the pupil shall have had such experience at home, or the opportunity of acquainting himself with the various phases of corn raising by observation, such experience is not to be despised.

In accordance with the latter plan, which, at the present time seems the more promising of success, the pupil is taught the elementary principles of agriculture throughout the school year, and near its close he is given the opportunity of applying his agricultural knowledge in a school garden, or home garden or field, which ever the case may be. This practical work should be carried forward during the following summer, if possible, under the supervision of a competent teacher. The pupil's past training will give him weapons with which to attack agricultural problems as they shall arise in connection with this practical work. He now applies his science intelligently.

We still have the pure science and the applied science, or the economic, methods of approach. In the former, the pupil is encouraged to learn the facts, principles, and laws of science for their own sake, while in the latter he is appealed to by the economic applications to which these may be put. The former is the method that has been universally used in our schools in

the past; but it has been pointed out,² and seemingly proved that the economic method of approach is superior when considered by the test of results.³ Of course we need further tests of this problem, especially on a large scale and under the normal conditions of the pupils in their local home communities with all the usual community and public school factors in full operation. The work might well be carried out with botany and that part of agriculture that deals with plants. Either spring or autumn might be selected as the time of year. One hundred schools, more or less, should be selected and paired off so that the schools of each pair would have very similar conditions of environment, community, local factors, equipments, teachers, number of pupils, races, etc. In one school of each pair, the pupils should study elementary botany via the pure science approach; in the other school, elementary agriculture by the economic-applied science approach. The topics of study should be the same in both cases. After a certain period, results from all the schools should be compared. The work should first be outlined and subsequently supervised by two persons—one versed in methods as applied to teaching elementary botany and the other in methods as applied to teaching elementary agriculture. The teachers should first have general and specific instructions with reference to the purpose of the experiment, the work to be presented, and the methods of instruction. The examinations for all pupils should be of two kinds, one part on the basis of pure science, and the other on the economic or applied science basis. The results of these examinations should be passed upon by the two supervisors in charge. This would be a very elaborate and extended piece of work, but it would doubtless yield significant results.

Another educational problem, both administrative and pedagogical, concerns itself with the selection, organization, and teaching of a series of type habits associated with approved agricultural practice. "Previously acquired habits very fun-

²Hall, G. Stanley: "Adolescence," Vol. II, pp. 153, 156-157. Appleton, New York, 1905.

³See the report of the experiment of J. P. Gilbert with pure and applied science methods of approach in secondary school science. *THE JOURNAL OF EDUCATIONAL PSYCHOLOGY*, Vol. I, pp. 321-330.

damentally influence future acts. Habits are stable and lasting to a degree quite equal to that of instincts and far greater than that of ideas. If ideas and instincts are sufficiently important to be considered as determining factors in the organization of teaching materials, we see no reason why habits should not also be so admitted.”⁴ Two objects should guide in the selection of this proposed course of habits; namely, preparation for the high school course, in “agricultural” habits, and preparation for making successful adjustments to the common and elementary conditions of farm life. “In the present status of habit training in the elementary school, pupils enter the high school without any adequate uniformity in the automatisms that they have acquired. It is true that a class of pupils often do possess many automatisms in common, but until greater progress is made in systematic habit training in the elementary school, the high school must content itself with using such automatisms as its pupils have incidentally acquired or assume the responsibility of first developing those habits that it wishes to make use of in later instruction.”⁵ The selection of any program of habits must never lose sight of their practical usefulness in securing immediate and serviceable adjustments to farm environments and rural life. There are many conditions in rural life to the stimuli of which country children should respond with definite automatic reactions. Habits of doing certain things at given times are absolutely essential in successful farming. The habits of selecting seed corn in autumn; of harvesting at the proper time; of storing grain properly; of grafting, mending tools, and doing other things that may be scheduled for the season of least activity; of cleanliness in milking; of testing the vitality of seeds; of starting early plants on time; of plowing when the season permits; of cultivating when the conditions require; of cutting cion and stock quickly and accurately so that the two parts of the graft will fit together nicely—these are only a few of the habits that should be established in the life activities of every successful farmer. Although the teaching of all these various

⁴Bricker, G. A.: “The Teaching of Agriculture in the High School,” p. 90. The Macmillan Company, New York, 1911.

⁵Ibid.

activities may not lie within the province of the elementary school, yet their enumeration will serve to give a conception of what is needed in the matter of habit formation. A series of type laboratory and field exercises should be planned with the object of furnishing the means of forming habits that the stimuli of farm life will tend to set in operation. These types should have an element of commonness with conditions that the pupil will likely meet on the farm. This common element in the situation of the farm life and the school training will suggest the use of certain habits previously learned at school; hence, the use of type practicums in developing skill in agricultural art. It is the element of commonness that gives the cue. There is at present great need for such a systematized series of exercises for the laboratory and field work of elementary agriculture.

Some of the most important pedagogical problems of elementary agriculture, then, are summarized by the following list of questions: 1. What portions of the subject of agriculture are adaptable for use in the elementary school? 2. In what grade or grades of the elementary school shall elementary agriculture be taught? 3. Are the principles of our present-day pedagogy applicable to the efficient teaching of elementary agriculture? 4. Shall experience in practical agricultural methods precede the study of the scientific principles involved, or shall the facts and principles be first studied, to be followed by their practical application? 5. Which gives the better scholastic and practical results, the pure science, or the economic-applied science method of approach? 6. Is it feasible to organize and teach a series of "agricultural" habits in the elementary school? There are only two ways by which correct and reliable answers to these questions may be secured; either by long and costly experience, or by immediate experimental methods.

COMMUNICATIONS AND DISCUSSIONS.

SPEECH DEFECTS AND INTELLECTUAL PROGRESS.

Speech defects usually date from very early childhood, so early that generally the origins go back beyond the patient's memory. Therefore this malady may be classed amongst children's diseases. And, though, like other disturbances of childhood, it may sometimes tend to a natural cure as the child grows up to maturity, a great many children do not outgrow the defect without help and, moreover, the disturbance runs through so many years of a child's life that often severe and permanent injury is done before a natural cure works itself out unaided.

From statistics gathered by the writer several years ago there are nearly half a million children with defective speech in our schools. That stuttering and stammering do not necessarily imply mental weakness is admitted probably by all who have given attention to the subject, yet a child's intellectual development may be seriously, and often permanently, impaired by defective speech. Such children usually are sensitive to the ridicule of their companions and classmates and hence are slow to express themselves. They withdraw within themselves and hence do not develop that healthy alertness and self-expression so necessary for vigorous and symmetrical mental growth.

Since the number of stammering and stuttering children is so large, it is a problem of serious import to guard the intellectual welfare of these unfortunates. The following data were collected with a view toward throwing some light on the relation between speech defects and mental progress. It is indeed difficult to measure a child's intellectual capacity or intellectual progress, yet the data at hand suggest some valuable inferences.

Though the opinion of parents is not scientific evidence, it is nevertheless interesting to note that H. Gutzmann in his long and extensive experience finds that 10 per cent. of the parents of 800 stuttering children admitted without being asked that the speech defect caused their children to be behind in school. He says that he has often found that children will remain two or three years in the first grade on account of stuttering, but when speech was cured they de-

veloped rapidly and not only kept pace with their class at the time of cure, but caught up what they had lost. He holds that at the age of three, four and five years something may be done toward a cure, but at a later age something must be done if the child is not to suffer severely in its intellectual development.

Westergaard made an investigation amongst 34,000 school children in Denmark. Of these 790 had defective speech. He says, assuming 100 in a class, the stuttering children had an average place of 55; those who nasalized, 60; those who stammered, 67; those who lisped, 61; (place 1 being the head of the class and 100 the foot). It will be seen from these figures that children with defective speech are in the lower half of the class. As to the average age of normal children and of children with defective speech in the different grades he gives the following figures: (Grades are numbered according to American conditions.)

	Grades.	1.	2.	3.	4.	5.	6.
a.	Average age of all children.....	6.8	8.1	9.3	10.5	11.7	12.3
b.	" " " " stutterers	7.3	8.5	9.8	11.4	11.7	12.7
c.	" " " " nasalizers	7.1	8.7	9.9	11.5	12.0	12.5
d.	" " " " stammerers	7.1	8.8	10.1	11.6	11.9	12.5
e.	" " " " lispsers	7.4	8.8	10.2	11.7	12.4	12.4
f.	" " " " b, c, d and e....	7.2	8.7	10.0	11.5	12.0	12.5

Comparing the average (f) with the average (a) we see that, throughout, the average age of children with speech defects is higher for the respective grades than the age of *all* the children.

An investigation made among 601 children with speech defects in the schools of Hamburg, Germany, shows that they are not promoted regularly, that is, they fall behind in their grades. The majority seem to be a year behind in their classes; in their fourth school year about 50 per cent. are below the fourth grade, in their fifth school year 65 per cent. are below the fifth grade, in their sixth school year about 77 per cent. are below the sixth grade, and in their seventh school year about 80 per cent. are below the seventh grade. Many of them lag way behind. In the sixth school year, for instance, nearly 16 per cent. are below the fourth grade, and in the seventh school year nearly 20 per cent. are below the fifth grade. In the eighth school year those that straggle far behind have almost all dropped out, and in the ninth school year practically all have dropped out, only two remaining, one in the fourth grade and one in the fifth grade.

In my recent investigation amongst 87,440 school children in six American cities, I found the following average age amongst the stutterers in the different grades:

TABLE I.

Grade.....	1	2	3	4	5	6	7	8
Average age.....	7.1	8.2	9.7	10.9	11.9	12.9	13.3	14.6

I have data as to the average age by grades of all school children in three cities, namely, Milwaukee, Springfield, Mass., and Cleveland, Ohio, from which some of the above data were obtained. The ages are as follows:

TABLE II.—*Springfield.*

Grade.....	1	2	3	4	5	6	7	8
Average age.....	6.4	7.5	9.4	10.1	11.3	12.2	13.2	13.11

TABLE III.—*Cleveland.*

Grade.....	1	2	3	4	5	6	7	8
Average age.....	6.5	7.9	9.0	10.3	11.2	12.1	12.9	13.6

TABLE IV.—*Milwaukee.*

Grade.....	1	2	3	4	5	6	7	8
Average age.....	6.6	8.1	9.0	10.2	11.3	12.2	13.2	14.2

Comparing the figures in tables II, III and IV with those of table I, we see that in every case the age of the stutterer is higher. Even though it may be difficult to measure the intellectual ability of a child, yet when we find that children with speech defects as a class are uniformly behind in their school work we may assume that their inferiority is in some way connected with their affliction. We should remember that such children are behind probably not on account of any mental inferiority, but, either because they are neglected by their teachers, or because they are discouraged on account of a sensitiveness with regard to their trouble or on account of the jeering of their classmates. Whichever of these causes may be operative, however, the fundamental condition is the defect of speech, and with the removal of that normal intellectual development becomes possible.

Stuttering is often accompanied by great psychic depression, usually due to the mockery to which the child or the youth is exposed. This depression interferes seriously with proper mental development; it is indeed sometimes so severe that it leads to suicide. This is especially true if the disturbance of speech persists up to the age of

adolescence. A number of cases of suicide are on record as due to this cause.

Tallahassee, Fla.

EDWARD CONRADI, PH.D.

THE NEW YORK STATE TEACHERS' ASSOCIATION.

The sixty-sixth annual meeting of the New York State Teachers' Association, in conjunction with affiliated associations—State English Teachers' Association, Modern Language Association, State Science Teachers' Association and New York State Association of Elocutionists—was held in Albany, November 27-29, and was an unqualified success. Up to this year meetings have been held in the summer vacation or in the Christmas vacation and with considerable dissatisfaction. The present plan, which will be doubtless continued, takes the entire time of two days on which the schools are normally in session. The school authorities in neighboring cities closed their schools entirely and in cities and towns over the state generally (with the exception of New York city) excused teachers who wished to attend. As a result, instead of the anticipated 1500, nearer 5000 teachers were in attendance. In every meeting "standing room only" might have been displayed.

Among the notable addresses were those of Rev. William B. Forbush on "Boys and Books," of Commissioner Draper on "The Necessary Basis of a Teacher's Tenure," of Rev. Lyman Abbott on "Education in a Democracy," of Supt. O. J. Kern on "Nature Study Agriculture" and "The Front Line of Country School Improvement," and of Prof. C. F. Hodge on "Civic Biology." The meetings of the association proper divided into fourteen sections—Normal and Training Class, Elementary Schools, Arts and Industrial Training, Home Economics, Commercial Teachers, Sub-Normal and Backward Children, Library, Music Teachers, Kindergarten Teachers, History Teachers, Mathematics Teachers, Classical Teachers, Rural Education, and Hygiene and Physical Education. In the well-attended meeting of the Sub-Normal and Backward Children Section, Miss Elizabeth Farrell, Inspector of Ungraded Classes, New York city, presided and outlined the work of the section in a vigorous and enthusiastic address. Dr. Isabelle Smart, Medical Examiner, New York City, gave an account, with many impressive statistics, of her work in the examination of sub-normal children. Miss Grace M. Böhne, Director of the Rochester Child Study Laboratory, discussed the

principles of the organization of classes for defectives, and Dr. Anne Moore, in treating the topic "The Next Step in Work for Sub-Normal Children," reported some striking results of her investigation of the sociological status of the feeble-minded. The ensuing discussion was opened by Helen M. Hamilton, Director Special Classes, Jersey City.

Perhaps the most notable feature of the whole session was the definite stand taken by Commissioner Draper in favor of such a legal tenure of office for every school teacher and officer in the state that no one might be removed from office, save in accordance with law and from a cause specifically stated in writing.

The next annual meeting will be held at Buffalo under the presidency of Dr. Percy I. Bugbee of the Oneonta Normal School.

G. M. W.

NEW YORK BRANCH OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION.

At the meeting of the New York Branch of the American Psychological Association, on Monday, November 27, the following program was presented:

AFTERNOON SESSION.

MR. D. O. LYON.—*The Relation of Quickness of Learning to Retentiveness.*—In working with tests of memory of digits, prose and poetry, Mr. Lyon found by no means perfect correlation between them. He found the quick learners the best retainers for prose and poetry, but the reverse in the case of digits.

PROF. S. S. COLVIN.—*Investigations in Progress in the Psychological Laboratory of the University of Illinois.*—In an extended investigation on transfer in learning, geometrical figures were drawn more accurately after practice, but less quickly.

In learning nonsense syllables, it seemed to make no difference in speed of learning whether all were given at one period, in two periods, or divided into four periods.

In studying the effect of aids and hindrances in learning, it was found that children learn best when they are not required to keep perfectly still, and that below the sixth grade writing the words is a hindrance instead of a help in learning to spell.

The size of children's vocabularies on entering school was found to be considerably larger than one would think.

The optimal illumination for judging certain lengths was found to be not so much a problem in psycho-physics as a matter of attention.

DR. HOLLINGSWORTH.—*The Action of Pharmacological Agents as an Aid in the Classification of Mental Processes.*—Caffein hinders certain mental processes as measured by records made in mental tests, and stimulates other mental processes. On this basis the color-naming, calculating and opposites tests fall together in one class, typewriting and the target test belong together in another class.

MR. J. W. TODD.—*Reaction to Simultaneous Stimuli.*—The reaction time to two simultaneous stimuli was shorter than to either alone, and to three simultaneous stimuli shorter than to either two alone.

EVENING SESSION.

MR. D. E. RICE.—*Visual Acuity Under Lights of Different Colors.*—Mr. Rice spoke of the conflicting results previously secured in this field of research, and of the difficulty he had experienced in getting a satisfactory method of procedure.

He found that for visual acuity in the sense of ability to distinguish form, when light is reflected from the form, red light is better than green, and green is better than blue. This is for objects near the eye. Where the visual stimulus is distant, green light is better than red.

MR. A. T. POFFENBERGER.—*Reaction Time for Different Retinal Areas.*—Reaction time is quickest in case of stimulation at the fovea, and quicker for stimulation on the nasal side of the retina than on the temporal side.

PROF. R. S. WOODWORTH.—*Correlation of Association Tests.*—Evidence was presented to show that a number of association tests had recently been improved so as to make them considerably more reliable as tests. The Pearson coefficient of correlation had been worked out for such tests as easy opposites, color naming, addition, and several varieties of the genus-species test. The average correlation between any one test and any other, for the thirteen subjects used, was .57. The correlation between adding and subtracting was .91. Many correlations were very high.

MR. G. C. MEYERS.—*Experiments on Incidental Memory.*—Different classes of persons—bankers, business men, college girls, rural people—all showed inaccuracy in estimating the size of familiar coins and of one dollar and five dollar bills.

B. R. SIMPSON.

Brooklyn Training School for Teachers.

ABSTRACTS AND REVIEWS.

RECENT STUDIES IN HANDWRITING.

MARY E. THOMPSON, A.M., Ph.D. *Psychology and Pedagogy of Writing. A Résumé of the Researches and Experiments Bearing on the History and Pedagogy of Writing.* Baltimore: Warwick & York, Inc., 1911. Pp. 128. \$1.25.

EDWARD L. THORNDIKE. *Handwriting.* Teachers' College Record, Vol. II: No. 2, March, 1910. Pp. 93. 30 cents.

G. M. WILSON. *The Handwriting of School Children.* Elementary School Teacher, 11: No. 10, June, 1911. Pp. 540-543.

FRANK N. FREEMAN. *Some Issues in the Teaching of Handwriting.* Elementary School Teacher, 12: Nos. 1 and 2, September and October, 1911. Pp. 1-7, 53-59.

JOSEPHINE TOZIER. *An Educational Wonderworker. The Methods of Maria Montessori.* McClure's Magazine, May, 1911. Pp. 1-19.

JUNE E. DOWNEY. *Preliminary Study of Family Resemblance in Handwriting.* University of Wyoming. Department of Psychology, Bulletin No. 1, 1910. Pp. 51.

The revival of interest in the discussion of methods and particularly the methods of presenting common school subjects is a significant result of recent investigations in psychology and experimental pedagogy. The old questions which have given rise to such heated differences of opinion, because the answers proposed for them rested merely on opinion, are being taken up and re-examined with reference to the experimental evidence that can be brought to bear upon them.

Such is the purpose of Miss Thompson's résumé of psychological investigations which have a more or less direct bearing upon the problems of handwriting, and she has rendered a valuable service to many teachers in bringing together these widely scattered data, published in technical journals inaccessible to the average teacher, and presenting them in orderly fashion with emphasis on their pedagogical applications. For the specialist in psychology Miss Thompson has nothing new to offer. She has made no original researches, nor

does she attempt to set forth any novel theories. Her message is to the teacher and layman rather than to the psychological expert. An introductory chapter on the importance of writing is followed by an outline of the historical development of the alphabet. From simple devices to aid the memory, through object pictures and word pictures, to verbal, syllabic and alphabetic signs we follow the evolution of graphic symbols to represent conscious meanings. This historical sketch ends, however, with that form of the Latin alphabet which is now used in printing, and no effort is made to trace the development of the cursive characters through the middle ages to the present style of script used in handwriting.

The discussion of writing itself begins with an analysis of the neural activities underlying the act of writing, and the author gives a lucid summary of the views of Mosso, Flechsig, Exner and the position recently taken by Pierre Marie. The attitude taken on the *agraphia* question is fair and open, and it is pointed out that whether there is a writing center or not makes little difference, as connections must be formed with other parts of the cortex in any case. The experimental studies of Bryan and of Gilbert on rapidity of movement, of Woodworth on accuracy of movement, of Downey on sensory control, of Johnson on the effect of practice, of Judd and McAllister on movements involved in writing, and of Gesell on the relation between accuracy and intelligence are described in some detail, and in the final chapter on the pedagogy of writing the experimental results are passed in review once more,—now from the practical standpoint of the teacher. In this chapter a portion of Thorndike's scale has been incorporated. There is a bibliography of 44 numbers, and a good index.

Professor Thorndike's monograph marks an important step in advance, not only in the subject of handwriting, but in the methods of experimental pedagogy, and in the whole field of educational investigation. Heretofore assertions in regard to the value of a given method, or the improvement made by a group of pupils, have rested upon the casual observations of individuals frequently more or less biased. The quantity of the performance could be readily indicated, but there was no objective standard of measurement for the quality. Professor Thorndike undertook to devise a standard which should rest not on the interested judgments of a few but on the concensus of opinion of a large number of competent judges. Samples of hand-

writing were secured from several hundred pupils in grades V to VIII, and these samples were arranged according to quality in 20 different groups by each one of 30 or 40 competent judges. From the averages of these judgments a scale was constructed in such a manner that the points on it were equidistant from each other. The highest point of the scale was a copy-book model, and the lowest (which was rated quality 4 from an ideal zero point of just no writing at all) was very bad writing artificially produced. To measure objectively the quality of a given sample of handwriting it is only necessary for several competent judges to compare it with the scale and to indicate independently the quality that it most resembles. Such a scale will, of course, not work automatically. Individuals will vary somewhat in their ratings. Yet it is surprising to note the agreement in the judgments of ten different observers, and the average will give a very accurate and constant determination. Even in the case of individual judgments it is of the greatest advantage to have some objective point of reference, so that the quality judgment described to others can be checked up later.

The monograph contains a detailed discussion of the method of constructing the scale, and suggestions for its subsequent improvement. There is also a scale of six points for the quality of adult women's handwriting. As an illustration of the use to which the scale can be put, there is given in part II of the monograph a comparison of seven different school systems in the writing of seventh and eighth grade pupils. There are decided differences in the ratings when the quality is considered apart from the speed, but there is relatively little difference in quality at the same speed.

The author admits that the scale is not yet perfect. Few of the steps contain a sufficient number of different styles of writing. The scale should ultimately be extended upward to include samples of the writing of high school pupils, college students, business men, clerical workers, and professional penmen, and downward to include samples of children's writing as low as the kindergarten. It would perhaps be advantageous if the steps of the scale were closer together. Such a need is felt especially in the middle region where most of the samples will fall. Again, more work should be done to determine the validity of the scale as already constructed. Would the results be the same if the samples were ranked by a group of business men, of bank tellers, or of professional penmen? What would

be the result if the samples were ranked on the basis of the rate at which they were read by a large number of competent readers, or on the judgment of ease of reading, instead of on the judgment of form? Other interesting questions might be raised which only further experimentation could answer. But the vista which is opened by this study is an extremely attractive one, particularly in view of the many possible applications of the method to other subjects. The reviewer is inclined to consider it one of the most noteworthy contributions to the science of experimental pedagogy during the past decade.

The first application of the Thorndike scale to the evaluation of the work of an entire school system was made by Supt. G. M. Wilson of Connersville, Indiana. Samples of "ordinary" writing were secured from all pupils and teachers of the school system from the first grade to the fourth year in the high school. The speed in number of letters per minute was computed for each of these samples, and they were rated for quality according to the Thorndike scale. The speed varied from 5 in the first grade to 211 in the high school, while the quality varied only from 9.2 to 11.8 (exclusive of teachers). It is surprising to find the quality so nearly the same in all the grades. Here and there a room was far in advance of others in the same grade, but the average quality lay between 9.9 and 10.4 from the second to the sixth grade, and between 11 and 11.8 from the sixth grade to the end of the high school. Why the sudden advance occurred just at the sixth grade is a question that remains unanswered. Nor does the author indicate under just what conditions the samples of "ordinary" writing were obtained. An attempt was made to answer the question how is quality affected by training for speed. The results with a 6A grade were as follows:

	Average speed (Letters per minute.)	Average quality (Thorndike).
Slow writing.....	46.8	14.95
Natural writing.....	73.1	14.66
Rapid writing.....	82.3	14.12

From this the conclusion is drawn that speed may be secured without any considerable sacrifice of quality. Unfortunately on account of the paucity of details it is difficult to evaluate these results.

On the basis of his own and other experiments Professor Freeman

discusses five questions in the teaching of writing. 1. Is vertical or slant writing to be preferred? Vertical writing has had the support of the hygienists, but there is no reason why a pupil should not sit in a hygienic position and still write a slant script. A free hand movement is only possible when the base line of writing is perpendicular to the forearm. But the easiest direction for the downward stroke is perpendicular to the edge of the desk. The combination of these two principles tells strongly against vertical writing and gives a physiological basis for the greater ease and rapidity of slant writing. 2. Should movement or form be the first to receive emphasis? The attempt to teach both together leads to a scattering of the attention which is objectionable. The results of drill in arm movement show little progress in the first three or four grades, but there is marked development in grades IV to VI. Therefore, the idea of the form of letters, which is fundamental, should be emphasized from the start, while strenuous drill in movement may well be postponed until the third or fourth grade. 3. Shall all the elements of the writing movement be trained at once? Perhaps it is well to take one component at a time, practicing finger movement, for example, at the desk, and arm movement at the blackboard, and uniting the two later. 4. Is it better to begin with sentences or with letters? The short sentence has more meaning for the child than the letter. At the same time the sentence should be quickly analyzed into its component elements, in order that the child may clearly distinguish the form of the separate letters. A combination of sentence and letter method is advantageous. 5. What form of movement is preferable, free arm movement, arm movement with rest (muscular movement), or finger movement? A combination of all three is advocated. Throughout the discussion the need for further experimentation is recognized.

Madam Montessori believes that children should be taught writing as a game between three and four years of age. She is a strong advocate of the development of the motor consciousness, and would begin by having the children trace with their fingers the form of the letters cut from coarse, black sandpaper and pasted on white cards. At the same time they are learning to read by forming words and sentences with these letters. Practice in holding the crayon is secured by filling in with colored crayons geometrical forms cut from cardboard and laid upon a sheet of paper. Later the children fill in the same

forms outlined with pencil. After six or eight weeks the child will have learned to write simple words and sentences, and when he once discovers that he can express his thoughts in writing he frequently evinces a perfect frenzy for it, and desires to write all the time. Excellent results are said to be secured by this method. After three months the children begin to use ink, and after six months most of them write as well as the average elementary third grade. How much of this account rests on the enthusiasm of the reporter only further tests can determine. Here would be an excellent opportunity to make use of Thorndike's scale with appropriate speed tests.

Professor Downey has made an interesting study of the factor of inheritance in the form of handwriting. Notwithstanding the approximation to conventional letter forms which results from the formal teaching of writing there is a tendency to lapse into characteristic styles of writing which frequently show striking resemblances to the handwriting of others in the same family. These resemblances can be explained only on the basis of family relationship, for all other factors, as training, environment, etc., may be different. The author says further that there is strong indication of the appearance in families of definite handwriting types, between which there may otherwise be great dissimilarity. If these inherited tendencies were more carefully studied and better known they might be of value to the teacher in her efforts to deal with the individual pupils in her charge.

J. C. B.

FREDERICK ARTHUR HODGE. *John Locke and Formal Discipline*. (Doctorate thesis, University of Virginia), Lynchburg, Va., J. P. Bell Co., Inc., 1911. Pp. 31.

Locke has been frequently cited as offering support in his philosophy for the doctrine of formal discipline. Dr. Hodge presents a reinterpretation of Locke's position. In the first place, he argues that the doctrine in question is a corollary of the doctrine of innate ideas, so that Locke, in his attack upon innate ideas, strikes at the foundation of the doctrine of formal discipline. Again, Locke is commonly held to be an advocate of a faculty psychology, yet the author believes that "in so far as formal discipline rests upon the faculty psychology, the empirical psychology of Locke offers it no support." Locke's views of the disciplinary character of logic and mathematics are also cited by some writers as evidence of

his support of formal discipline. The author argues, however, that Locke's statements must always be interpreted in the light of his system as a whole, and that, when thus interpreted, it appears that Locke "would have all men study mathematics because of a certain method used therein." But most opponents of the dogma of formal discipline are ready to admit that certain "concepts of method" may be derived from the pursuit of certain studies and that these concepts may carry over into other fields of mental activity.

In summary, the author concludes: "First, that Locke's philosophy and psychology furnish no basis for the dogma in question. Second, that he sought to set aside the limited curriculum based on the disciplinary conception of his time and substitute for it a broader curriculum. Third, that he urged the abolition of abstract rules and generalizations in favor of concrete specific experiences. Fourth, that Locke's various references to education as a discipline may best be interpreted in the light of *Specific Disciplines and Concepts of Method* and such interpretation is consistent with his philosophy."

Cornell University.

ROY C. HOLL.

WILLIAM P. TRENT, OLIVER HUCKEL, JOHN PRENTISS POE, LIZETTE WOODWORTH REESE, AND MRS. JOHN C. WRENSHALL. Edited by Heinrich Ewald Buchholz. *Edgar Allan Poe: A Centenary Tribute*. Baltimore: Published for the Edward Allan Poe Memorial Association by Warwick & York, Inc., 1910. Pp. 102. Bound in buckram, \$1.50.

In this interesting volume the tragic story of America's most original poetic genius is presented from several different points of view. Not only during his lifetime but long after his death it has been Poe's fate to stir up the bitterest controversies between his ardent and enthusiastic admirers and his relentless and implacable detractors. Dr. Trent gives a masterful account of this struggle for recognition, shows how much earlier and more justly Poe was appreciated abroad than at home, and points out the reasons why the poet's type of mind was necessarily antagonistic to the New England influences then dominant to American literature. But of late years a more dispassionate attitude is evident, and the lines along which Poe's life and work will continue to claim attention are gracefully and succinctly set forth.

Dr. Huckel gives a warm-hearted appreciation of the unique genius

of Poe's poetry, and his kinsman, John Prentiss Poe, brings together the tributes of leading men of letters to the poet's personality. One of the most attractive chapters in the book is Mrs. Wrenshall's "Sketch of the Life of Edgar Allan Poe from the Testimony of His Friends." A feature of the work is the large number of portraits of the poet, and the photographs of his monument in Westminster Churchyard.

PETER STERLING.

Modern Schoolhouses, City and Suburban. New York: The Sweetland Publishing Co., 1910.

This admirable work consists of a series of compact and authoritative articles upon the important aspects of schoolhouse planning, sanitation, heating and ventilation, and a rich collection of illustrative material covering about 150 pages. These illustrations include the best examples of modern school architecture, from the four-room suburban building to the largest and most complex plant for the housing of city high, technical or normal school. The collection is further enriched by a large number of plans, working drawings and descriptions, many of which are first published in this volume.

The following quotation from the preface is a fair and accurate statement of the character of the book:

"In the selection of schoolhouses gathered together in this volume will be found a fair representation of the most recent developments in their planning, architectural handling, and mechanical equipment. The articles likewise have been chosen to cover the subjects in the broadest manner and without unduly accenting any one type, material, process or device over another that may possess equal merit for other conditions."

With respect to the illustrative material, it is sufficient to say that it is the most practically valuable collection of plates relative to school architecture to be found in any single volume. The textual matter is limited in scope and extent—much less comprehensive than the older works of Wheelwright, Briggs and Clay—but this is compensated for by quality and compactness.

The articles are written by men who, during the past 20 years, have *created* school architecture. The article by Professor Hamlin of Columbia on "Considerations in Schoolhouse Design" is singularly clear, comprehensive and right in its contentions.

The illustrations are triple indexed—general, by location and by architect.

The book is invaluable to architects, sanitarians, school boards and superintendents.

W. S. SMALL.

Eastern High School, Washington, D. C.

FLETCHER B. DRESSLAR. *American Schoolhouses*. Washington: Bureau of Education, Bulletin 444, 1911. Pp. 133.

This is a monograph which should be of great value to school boards, school architects and others who have to do with planning school buildings. But it is not to the technical man alone that the book will appeal. The greater part of its bulk is due to the 267 plates, most of them full page, many of them even double page, which represent pictorially and by means of floor plans the latest and best in American school architecture and equipment. These speak directly even to the uninitiated.

The author says in his foreword that this is not a treatise on school hygiene, yet those points of school hygiene that depend on the construction of the school building find here a simple, direct and untechnical treatment which is of more value than most of the formal treatises. For example, the best and most economical means of securing foundation walls free from moisture are briefly indicated, the most advantageous arrangement of rooms is carefully canvassed and the different types profusely illustrated with excellent photographs, the desirability of school baths even in country schoolhouses is cogently set forth, and the heating and ventilation of schoolrooms receive concise but practical and helpful consideration. An appendix on "Types of Modern Schoolhouses" emphasizes some of the salient points in present tendencies of construction, and a good index makes the monograph usable for reference.

PETER STERLING.

NOTES AND NEWS.

No other scheme of mental measurement has attracted so general interest in a short time as the Binet-Simon tests. Much valuable **THE BINET-SIMON TESTS.** effort is now spent profitably in trying out and criticising them. But it may be safely predicted that the very feature which at present seems to be the essential, namely the determining of the mental age of a child, will be largely lost in the process of refining the tests. It is strange that the many keen critics who are now working on the problem have not grasped the fact or, at any rate, have not dealt with it further than the original authors have.

Retardation does not follow a common, flat level any more than growth does, nor even nearly so much. A child develops one capacity several times as fast, and often at the expense of another faculty. This differentiation is even more striking in retardation. What is more, those who employ the tests for practical purposes should not be satisfied with a flat mental age, except for the purpose of rough classification, *e. g.*, to determine whether or not a child is feeble-minded. In the study of the normal individual we seek to discover his fortes and his faults, in short, to discover his particular deviation from the norm of the common level. There is no reason why the Binet-Simon tests should not develop into specific measures of the relative rank, or age if you please, of more specific capacities and powers, such as reasoning ability, sensory observation, memory, imagination, initiative, emotional life, self-control, etc. A child may be at the mental age of six in one capacity and 12 in another, and the important thing to know about the individual is this difference and direction of unsymmetrical development. It may be that a general flat age test must be retained for certain purposes, but even that must be interpreted in the light of measures of specific capacities. Only by extension in recognition of this principle can any set of tests be of permanent value in orthogenies.

C. E. S.

During the past year or two much space has been devoted in the popular prints to the feats of certain precocious youngsters in various parts of the country, and on the basis of these glowing accounts many valiant attacks have been made upon the work of the schools as not only inadequate and inefficient but positively stultifying. In a recent number of *Science* (November 17) Professor O'Shea has taken up the challenge and has broken a lance in defense of the schools. Professor O'Shea has rendered a service in pointing out the fact that in spite of the many tales that are told, there is no careful and trustworthy record of precisely what these young people are able to do. This is most unfortunate, and should be remedied, both in the interests of scientific accuracy, and in order to establish standards of possible pedagogical attainment. Professor O'Shea notes that it is fairly easy to train very young children to go through the form of pronouncing selections from Shakespeare or Emerson, or making a show of algebraic formulæ, but this may be far from reading or mastering mathematics in the adult sense. But has he not missed the crucial point in the significance which these exceptionally gifted children (if they are such) have for general pedagogical procedure? It may be true that from the standpoint of pure precocity the average two-year-old, with his vital knowledge of living and inanimate things, far surpasses the manikin who can juggle with words or apply geometrical formulæ to particular problems. But may not the two kinds of knowledge co-exist in the same person? Surely they are not mutually exclusive. And would it not be a decided gain if instead of occupying himself with mere aimless activity the young child could under the guise of play master the mechanics of reading, writing and number combinations, so that he would have these tools at hand for the more important work of thinking? The claim is made for the precocious children that they have merely been encouraged to advance as rapidly as they wished. Shall we call this "forcing"? If so, would it not be desirable to have more of it in the schools? A thoughtful public school man of our acquaintance prefers to send his seven-year-old son to private school because there the boy does all the work accomplished in the public schools in one-half the time, and thus is not so apt to form habits of idling away his time in school. It is seldom that a child is encouraged to do his utmost in the lower grades of the public school. There is too much routine for that. Whether any

other condition of affairs is possible in our large school systems with classes of 50 and 60 pupils is a question for the future.

J. C. B.

On Friday and Saturday, December 1 and 2, the National Association for the Study and Education of Exceptional Children held its second annual conference on the problem of the exceptional child at New York University and the Society for Ethical Culture, New York City. The topics discussed were "Causes of Exceptional Development in Children," "Educational Needs of the Various Kinds of Exceptional Children" and "The Exceptional Child as a Social Problem."

Dr. Edmund B. Huey, who has for some time been making examinations of defective children and of aphasic patients at the Johns Hopkins Hospital, has been appointed lecturer in mental development in the Johns Hopkins University and assistant in psychiatry in the Phipps Clinic of the Johns Hopkins Hospital. From January to June, 1912, Dr. Huey will give, at the university, a series of weekly public lectures and clinics on the subject of backward and feeble-minded children, and on related phases of clinical psychology.—*Science*.

Dr. Anna J. McKeag, head of the department of education in Wellesley College, has accepted the presidency of Wilson College (Chambersburg, Pa.), and will assume the duties of her new position on February 1. Miss McKeag will retain the work in education at Wilson College, and hopes to make that department a vital force in the work of the institution and a powerful influence in the educational life of the Middle States. Miss McKeag's work in Wellesley will be continued by Dagny N. Sunne, Ph. D., formerly of the Woman's College of Alabama, who has been appointed instructor in the history and principles of education for the second semester.

Dr. Eleanor Harris Rowland, associate professor of philosophy and psychology, Mt. Holyoke College, has resigned to become dean of women at Reed College, Portland, Oregon.

Dr. John B. Watson, professor of experimental and comparative psychology, Johns Hopkins University, will give courses at the summer session of Teachers' College, Columbia University, in 1912.

CURRENT PERIODICALS.

(In this section only such articles will be noticed as bear directly or indirectly upon the interests of this Journal.)

ZEITSCHRIFT FUER PSYCHOTHERAPIE UND MEDIZINISCHE PSYCHOLOGIE. Vol. III, 1911. No. 1. ALBERT MOLL. *The Treatment of Sexual Perversions, with Especial Emphasis on Association Therapy.* 1-28. An outline of prevailing methods of treatment is followed by a plea for a psycho-pedagogical method which will gradually substitute normal, healthy images for the perverse ones, and build up a system of normal associations in the consciousness of the unfortunate patient. No. 3. PAUL GAEDEN. *On the Psycho-Physiological Significance of Atmospheric Conditions, with Special Reference to Light.* 129-157, 206-235. An extended contribution to the subject of periodicity and seasonal changes. No. 4. GUSTAV MAJOR. *Institutional Education and the Treatment of Defectives.* 193-206. Of 170 children that have recently come under the care of the Berlin Child Welfare Society, 143, or almost 80 per cent., were in some sort mentally defective. The author declares that every defective psychopathic constitution contains within it a tendency to criminality. Many of these defectives, if given institutional care and training, could be rendered useful members of society instead of developing into criminals. No. 5. TH. HOEFNER. *Psychological Considerations on Stuttering and Speech. A Contribution to the Aphasia Question.* 264-289. The author claims that a particular, sense-destroying, meaningless linguistic error is a sign of peculiar associational relationships, and not of a weakness in the neural basis of speech. Every stutterer suffers from a momentary aphasia, but this aphasia depends wholly upon surrounding conditions which inhibit the normal linkage of associations. When the stutterer stutters he only does what he thinks.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

FELIX ARNOLD. *Outline History of Education*. New York: The Bay Press, 1911. Pp. 109.

The book begins with a discussion of contemporary movements in education, and works back to the more remote periods. It would be a convenient aid for rapid review.

C. W. BARDEEN. *Tom and Tom Tit and Other Stories About Schools*. Syracuse, N. Y.: C. W. Bardeen, 1911. Pp. 286. \$1.00.

Six stories of school life by the editor of the *School Bulletin*, in a vein similar to his half-dozen other books of stories about teachers and schools. Written in an unpretentious, yet realistic style, these stories are full of commonsense and convey in an unobtrusive manner many hints and suggestions of value to the classroom teacher.

Bibliography of Education for 1909-1910. Washington: Bureau of Education, Bulletin 456, 1911. Pp. 166.

FRANZ BOAS. *The Mind of Primitive Man*. New York: The Macmillan Company, 1911. Pp. 294. \$1.50 net.

This important book embodies the author's lectures before the Lowell Institute and the National University of Mexico, 1910-1911, and includes in revised form several of his earlier essays. It treats of racial prejudices, influence of environment and heredity upon human types, the mental traits of primitive and of civilized man, race and language, the evolution of culture, and concludes with a discussion of race problems in the United States. The treatment is argumentative and would be difficult for normal school or college students, though useful for reference in classes studying mental development.

DR. ED. CLAPARÈDE. *Psychologie de l'Enfant et Pédagogie expérimentale*. (Fourth edition, revised and extended.) Geneva: Librairie Kündig, 1911. Pp. 471.

The English translation of this edition, under the title "Experimental Pedagogy and the Psychology of the Child," has been annotated in the November issue.

S. A. COURTIS. *The Comparative Test as an Educational Ruler*. Reprinted from *American Education*, 1911. Pp. 13-18.

An able plea for the more extended use of measurements in education. The author has cleverly expressed the results of a number of recent experimental studies in the form of curves.

GEORGE V. N. DEARBORN. *The Neurology of Apraxia*. Reprinted from the Boston Medical and Surgical Journal, 164: No. 22, June 1, 1911. Pp. 783-786.

A study in the neural basis of voluntary movements. Apraxia is defined as "an incapacity for subjectively purposive movements, with conservation of the power of movement."

FRANCES DENSMORE. *Chippewa Music*. Washington: Government Printing Office, 1910. Pp. 216.

A very valuable first hand study.

EDWARD A. FITZPATRICK. *The Educational Views and Influences of De Witt Clinton*. New York: Teachers' College, Columbia University, 1911. Pp. 157. \$1.50.

A valuable contribution to the history of education in New York State.

KARL GROOS. *Das Seelenleben des Kindes*. (Third edition, revised and enlarged.) Berlin: Reuther und Reichard, 1911. Pp. 334. M. 4.80.

The fact that a new edition of this work has been called for so soon attests its popularity with German readers. The second edition was reviewed in this JOURNAL, Vol. II, p. 40.

MAXIMILIAN P. E. GROSZMANN, Ph. D.. *The Career of the Child from the Kindergarten to the High School*. Boston: Richard G. Badger, 1911. Pp. 335. \$2.50 net.

This book has an introduction by F. E. Bolton, covers ambitiously a wide range of topics, "contains a complete system of suggestions for the entire career of the elementary school, such as can be almost immediately adjusted to various local conditions," and is advertised to be "without question, the most valuable contribution yet made to the intelligent study of the education of the child." We have not had time to verify this claim, but we note that the print is unpleasantly small, that the references, where any are given, are thrown together in a helter-skelter manner, and that there is no index.

EDWARD JOHN HAMILTON. *Perzeptionalismus und Modalismus*. Leipzig: Dr. Werner Klinkhardt, 1911. Pp. 115.

A translation of an epitome of the author's system of philosophy.

FREDERICK ARTHUR HODGE. *John Locke and Formal Discipline*. Lynchburg, Va.: J. P. Bell Co., Inc., 1911. Pp. 31.

Reviewed in another section.

H. E. JORDAN. *The Inheritance of Left-Handedness*. Reprinted from American Breeders' Magazine, 2: 1911, Nos. 1 and 2.

On the basis of a questionnaire canvas of 700 university students.

1394 white and 668 colored public school children, he finds about 2.5 per cent. of left-handedness in the whites, but 4.3 per cent. in the negroes. No sex differences appeared. In the second group the ratio of right-handed to left-handed persons in the affected families was 1 to 2, in the third group, 29 to 25. The evidence, therefore, favors the view that left-handedness is hereditary. A further and more detailed study, to include other matters of educational interest, is promised.

HARRY PRATT JUDSON. *The Higher Education as a Training for Business*. Chicago: The University of Chicago Press, 1911. Pp. 56. Cloth. Postpaid, 55 cents.

Higher education teaches the value of money and its use, and trains honesty, industry, mental grasp, adaptation to society, and the enjoyment of wealth.

HARRY EDWIN KING. *The Educational System of China as Recently Reconstructed*. Washington: Bureau of Education, Bulletin 462, 1911. Pp. 105.

This discussion of the Chinese school system by the vice-president of Peking University may be considered authoritative. It contains a historical sketch of Chinese education to 1909, an account of the controlling agencies of the educational system, and a description of elementary, secondary and higher educational agencies recently established. In these days of the reawakening of China it is of great interest to have portrayed for us those undercurrents of educational influence which made the present movement possible.

ARMAND LAURENT. *De l'Hygiène Pré-Scolaire au point de vue de l'Arriération Mentale*. Paris: Henry Paulin & Co., 1911. Pp. 42 1 fr. 50.

Outline of a practical program given as a "charge" to the *Société Normande d'Hygiène*.

ARMAND LAURENT. *Quelques Mots sur l'Arriération Mentale*. Rouen: Imprimerie J. Girend, 1909. Pp. 28.

A good discussion on the classification and treatment of the *Arriérés*.

E. B. LOWRY, M.D. *Herself: Talks With Women Concerning Themselves*. Chicago: Forbes & Co., 1911. Pp. 221. \$1.00.

By the author of *Confidences* and of *Truths* (reviewed in this JOURNAL, October, 1911), written to fill the need of a book for women on matters of sex. Its 25 chapters cover a wide field, *e. g.*, anatomy, physiology and pathology of female genital organs, fake medical advice, sterility, abuse, abortions, divorce and the marriage relation, flirtation, white slavery, the business woman, the nervous woman,

sex instruction of boys and girls, etc. The style is lucid and attractive and many sections are impressive. Parental influence (pp. 97-8), however, is treated neither clearly nor accurately.

O. S. MARDEN. *Pushing to the Front*. Petersburg, N. Y.: The Success Company, 1911. Pp. viii, 824.

This is a book that tells boys just how to go about it to win success in life. Through 66 chapters the author reiterates the world's stock of time-worn platitudes, vitalizing them by innumerable concrete illustrations taken mainly from biography. If the book only possessed an index it would be a useful compendium for the teacher or lecturer who is constantly in need of illustrative anecdotes. This defect, however, will not prevent it from meeting a definite need in education. The commonplace truths must be brought home afresh to each generation, and, in spite of contemporary tendencies to laugh explicit moral instruction out of court, it cannot be denied that books of this type make an effective appeal to the adolescent mind and have their sphere of usefulness.

ERNST MEUMANN. *Vorlesungen zur Einführung in die Experimentelle Pädagogik und ihre psychologischen Grundlagen*. Volume I. Second edition, revised and enlarged. Leipzig: Engelmann, 1911. Pp. xix, 725. M. 9. Geb. M. 10.25.

Meumann's *Experimentelle Pädagogik* has taken rank as the most authoritative presentation of the aims and methods of the new science of experimental pedagogy. The first edition has been out of print for some time. In the second edition the work will be enlarged to twice its former size, and will consist of three volumes instead of two. Especial emphasis is laid upon the exposition of the methods and technique of pedagogical experimentation. Volumes II and III are in preparation and are promised for the immediate future.

MAX OFFNER. *Das Gedächtnis. Die Ergebnisse der experimentellen Psychologie und ihre Anwendung in Unterricht und Erziehung*. Second edition, enlarged. Berlin: Reuther und Reichard, 1911. Pp. ix, 258. M. 3.50.

This book, the first edition of which was soon exhausted, has received the highest commendation from German reviewers for its clear arrangement and its intelligible presentation of the results of recent experimental work on memory. The author avoids physiological explanations, and bases his discussion on the theory of psychic dispositions.

WILHELM PETERS. *Gefühl und Erinnerung. Beiträge zur Erinnerungsanalyse*. Reprinted from Kraepelin's *Psychologische Arbeiten*, Bd. 6: Heft 2, 1911. Pp. 197-260.

This interesting study attacks the problem of the feeling tone of

memories as compared with the feeling tone of the original experiences. Of the affective experiences recalled two-thirds were agreeably toned in the original experience. More remote experiences showed a higher proportion of agreeably toned cases than recent ones. Only half of the memories showed any affective tone, and of these almost two-thirds were agreeable. Of the agreeable experiences 55 per cent. retained the same feeling tone as memories, while 32 per cent. became indifferent. Of the disagreeable experiences 49 per cent. retained the same tone in memory, and 43 per cent. had become indifferent. There is thus a somewhat greater tendency for disagreeable experiences to become indifferent than for agreeable experiences.

L. G. POWERS AND W. S. SMALL. *Standard Form for Reporting the Financial Statistics of Public Schools*. Washington: Bureau of the Census, 1911. Pp. 28.

"The purpose of this monograph is to present to the fiscal officers of the public schools a practicable, uniform method of accounting. The adoption of such a uniform system of accounting and reporting will greatly facilitate the collection of the financial statistics of schools and materially reduce the cost of same. It will also make possible a comparison of the efficiency and economy of school systems, and will furnish a basis for a more intelligent study of school administration than has been possible heretofore." Copies of the form are to be had on application to the Census Bureau. It is unfortunate that the Census Bureau and the Bureau of Education did not come to an agreement on a form for financial statistics.

WILLIAM CARL RUEDIGER. *Agencies for the Improvement of Teachers in Service*. Washington: Bureau of Education, Bulletin 449, 1911. Pp. 157.

"Agencies for the improvement of teachers in service are needed primarily for three reasons: (1) Because many teachers enter the profession relatively untrained and therefore need to be trained in service, if at all; (2) because complete training is impossible before active service begins, for the reason that the necessary basis for it is not at hand; and (3) because teaching is a progressive calling, in which one who does not continually make efforts to go forward will soon lag behind and become relatively inefficient." Among the topics discussed are teachers' institutes, summer schools, extension teaching, correspondence study, teachers' meetings and reading circles, and the merit system of promotion.

SANTE DE SANCTIS. *Frenastenici e anormali psichici*. Reprinted from *Rivista Ospedaliera*, 1911, No. 10. Pp. 15.

The defective child presents a three-fold problem: Medical, scholastic and social. In order to secure an advantageous approach to the problems involved, a classification of defectives is necessary. The

author purposes a classification into five groups, according to the degree of deviation from the normal. He does not suggest names for these groups, but shows that in each group would be found cases which have been called by many different names, depending on the point of view from which the cases have been considered.

GEORGE DRAYTON STRAYER. *Age and Grade Census of Schools and Colleges. A Study of Elimination and Retardation.* Washington: Bureau of Education, Bulletin 451, 1911. Pp. 144.

This valuable study is based on a census of 318 school systems taken in the first week of December, 1908, in accordance with an age grade blank sent out by the bureau of education. The complete tables of registration are given, and from these the frequencies of retardation and advancement, and the percentages of the largest age groups in the different grades have been plotted.

HARLAN UPDEGRAFF. *Teachers' Certificates Issued Under General State Laws and Regulations.* Washington: Bureau of Education, Bulletin 465, 1911. Pp. 269.

An elaborate compilation of the regulations for entrance to the teaching profession.

JAMES H. VAN SICKLE, LIGHTNER WITMER AND LEONARD P. AYRES. *Provision for Exceptional Children in Public Schools.* Washington: Bureau of Education, Bulletin 461, 1911. Pp. 92.

This valuable monograph gives a clear and concise account of the provisions made for exceptionally dull and specially gifted children in the United States. The most important chapters discuss the discovery of the exceptional child, proportion of exceptional children, classification, methods of determining retardation, plans of grading and promotion, and a detailed account of conditions by school systems.

NIXON WATERMAN. *"Boy Wanted."* Chicago: Forbes and Company, 1911. Pp. 134. \$1.25. *The Girl Wanted.* Same, 1912. Pp. 158. \$1.25.

These two books of "cheerful counsel" and "friendly thoughts" are very interesting attempts to proffer ethical precepts in such a guise that boys and girls will read them willingly and profitably. The first deals with such topics as self-made men, genius, industry, opportunity, over and underdoing, the value of spare moments, cheerfulness and practicability; the second with such topics as choosing the way, accomplishments, everyday virtues, golden habits, the purpose of life, etc. The plan in each book is to give two-thirds of each page to the author's text and the remainder to pertinent quotations from the world's best authors. The books are attractively illustrated and artistically gotten up.

GUSTAV GOTTLIEB WENZLAFF. *Teachers' Handbook of Psychological Principles*. New York: Charles E. Merrill Co., 1910. Pp. 39.

This is one of the misguided attempts to skim the cream off the science of psychology to lubricate the path of the teacher. The result does harm both to psychology and to the teacher.

GUSTAV GOTTLIEB WENZLAFF. *The Mental Man: An Outline of the Fundamentals of Psychology*. New York: Charles E. Merrill Co., 1909. Pp. 272.

The ideal text-book of psychology for teachers has not yet been published. The present work is an attempt to popularize the material which is to be found in any first-class text-book of physiological psychology, and will doubtless meet with considerable favor. The student, must be considered unfortunate, however, whose idea of psychology rests upon such presentations as this.

WILLIAM PARKER WILARTON, A. M. *Experimental Study of Ideational Types of School Children on the Basis of Ten Different Methods*. New York: Published by the author, 1911. Pp. 120.

The author of this "thesis submitted in partial fulfillment of the requirements for the doctorate in philosophy in New York University" has done an excellent piece of work in subjecting the various methods of determining ideational types to a critical, comparative test on school children. The methods tested were Kraepelin's and Secor's word methods, Binet's and Cohn's methods of letter squares, Washburn's and Meumann's distraction methods, Meumann's method of helps, Pedersen's dictionary method, and Seashore's and Netschajeff's methods of securing the pupils' introspection on their own mental types. The tests were made on upper elementary and high school pupils. No pronounced mental types were discovered, and the tendencies found in one test were contradicted by those revealed by another. The conclusion is expressed that there is no reliable method for determining the imagery of children.

LOUIS N. WILSON. *Bibliography of Child Study for the Years 1908-1909*. Washington: Bureau of Education, Bulletin 457, 1911. Pp. 84.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

A TENTATIVE REVISION AND EXTENSION OF THE BINET-SIMON MEASURING SCALE OF INTELLIGENCE.

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PART I.¹

INTRODUCTION.

In the light of the numerous recent studies of the progress of children through the grades it would appear that the time had arrived to determine more definitely than has yet been attempted the qualitative nature of the phenomena of retardation and acceleration. This determination should proceed along two lines. It should ascertain as far as possible the native intellectual endowment of each pupil, and it should undertake to establish with reference to acceptable standards his exact pedagogical status.

Though the latter task is by far the easier—is, in fact, quite feasible for most kinds of school work—we have barely set about its accomplishment. Except in handwriting and arithmetic, there are no generally acceptable standards of school

¹This is the first of a series of articles. Part II will set forth the results of additional tests and Part III will give the author's revision and extension of the scale.

performance which enable us to make a reliable comparison of different pupils and schools. The average superintendent of schools accepts on faith the accomplishments of his own system and looks with suspicion on those of other schools, as is proved by the retardation which pupils usually suffer when they change from one school system to another. Such chaos cannot continue indefinitely now that the standarization has begun, and it does not seem unreasonable to expect that within a few years we shall have measures which will permit the expert determination of the efficiency of a school's efforts in most branches of the curriculum.

Measurements of intelligence are far more difficult to make, but even more important than those of pedagogical status. The degree of intelligence is a factor in every performance. Unfortunately, however, its influence cannot be isolated from that of training. Intelligence cannot work without ideas, and the quality and number of the latter are largely dependent upon accidents of environment. In our efforts to measure intelligence, therefore, we always measure intelligence plus a certain kind and amount of training. The only way to make sure that our measurement will arrive at any approximation to the former is to choose for our tests types of performance which will not be too greatly influenced by such differences in training and experience as ordinarily exist among the children of civilized people living under fairly uniform conditions of home life and educational advantages. While the social inheritance cannot, of course, be wholly identical for any two individuals, however similar their environment, there is nevertheless a limited social inheritance common to practically all who are possessed of a mentality sufficiently normal to make it their own. The environment of two children living in the same country under anything but exceptional conditions probably resembles a great deal more than it differs. The mere fact of a 12-year-old child's ignorance of the names of the month is not, *per se*, a reflection upon the child's intelligence. The child may be deaf, or he may have been reared by feeble-minded parents, or he may never have attended a school. But if the 12-year-old has had the usual home and school advantages

common to a civilized people such a deficiency as that noted becomes decidedly significant. Even then, however, we should not be justified in pronouncing the child subnormal upon this evidence alone. Gaps may occur in the education of anyone. It is only when the child's intelligence has been triangulated from many positions, and always to its disadvantage, that we can reasonably infer the presence of a subnormality marking the subject as incapable of acquiring the common elements of our social inheritance.

Surveys of this nature are possible only in so far as we have age norms for different lines of performance, few of which have yet been established. Many studies have been made showing age and grade tendencies for certain kinds of mental ability, but for the most part these have either been too limited in scope, or have not utilized non-selected subjects, or else have been made under conditions impossible to duplicate. Worst of all, the experimentation has been of haphazard nature instead of being guided by some directing idea like that of establishing definite age or grade standards. The Binet tests of 1908 are the only set hitherto devised covering any considerable variety of functions or directed by any comprehensive plan. The invaluable contribution of Binet consisted in the simple device of arranging the tests in a series of groups according to their difficulty as determined by age differences in performance. In spite of the limited data which served as the basis for his scale, the 1908 tests of intelligence immediately became serviceable and already seem to have proved their worth to all who have experimented with them. The series can readily, by extensive and thorough trial, be indefinitely extended, refined and adapted to different conditions and purposes. The following preliminary and imperfect study is offered as a slight contribution to this end.²

The purposes of this study are (1) to determine the adaptability of the Binet tests to American conditions; (2) to discover the changes in serial arrangement that may be necessary

²This study was completed before the publication of Binet's 1911 revision, and before the appearance of Goddard's and Bobertag's criticisms.—AUTHORS.

to make them reliable; (3) to try out certain other tests designed to supplement the Binet series, and (4) to arrive at some conclusion as to the psychological and pedagogical value of the tests individually and collectively.

SOURCES OF DATA AND CONDITIONS OF THE STUDY.

Between February 1 and May 1, 1911, the writers, with the assistance of Miss Katherine Kip and Miss Edith M. Bushnell, gave the Binet tests to 396 non-selected children.³ The schools selected for the tests were a district school on the Stanford University campus, attended almost equally by the children of college professors and of laborers (30 children); the public schools of the village of Mayfield, Cal., where about one-half of the entire number were tested (72); the city schools of Palo Alto (150); a rural school near Stanford University (20), and two public kindergartens at Long Beach, Cal. (124). In the campus school, rural school and kindergartens practically all the pupils were tested; in Palo Alto the tests were given to the entire third and fourth grades of one building, to one-half the A and B fifth grades, and to several in each of the first, second, sixth and seventh grades. Where not all the pupils of a room were tested, as was the case in the Mayfield and some of the Palo Alto work, care was taken to secure representative case by requesting teachers to send only pupils whom they considered of average intelligence, or, in case a pupil of either exceptionally high or low ability was submitted, to follow this by another varying in the opposite direction from the normal. It is believed that the material is about as representative, with the exceptions later to be designated, as could be secured. As far as home advantages and social milieu are concerned the pupils are probably not very different, on the whole, from what would be found in the better class villages

³The tests were all made under the supervision of Dr. Terman, who himself applied the tests to about 90 children. Two hundred and twenty-two pupils were tested by Mr. Childs, and 124 by Miss Kip and Miss Bushnell. About 40 of the cases tested by Dr. Terman were a selected retarded group, the data from which could not be included in this study. The writers are greatly indebted to Miss Kip and Miss Bushnell for their very able and exceedingly careful assistance.

and towns from New England to California. The age and grade distribution was as follows:—

Age.	Number.	Grade Distribution.
4 years	29	27 (Kgn), 2 not in school.
5 years	83	81 (Kgn), 2 not in school.
6 years	26	17 (Kgn), 9 (I).
7 years	29	13 (I), 12 (II), 4 (III).
8 years	43	7 (I), 15 (II), 16 (III), 5 (IV).
9 years	49	2 (I), 2 (II), 16 (III), 26 (IV), 3 (V).
10 years	33	6 (III), 13 (IV), 11 (V), 3 (VI).
11 years	44	1 (II), 3 (III), 13 (IV), 18 (V), 7 (VI), 2 (VII).
12 years	35	6 (IV), 11 (V), 2 (VI), 7 (VII).
13 years	17	1 (IV), 5 (V), 4 (VI), 6 (VII), 1 (VIII).
14 years	6	3 (VI), 3 (VIII).
15 years ¹	2	1 (VI), 1 (VIII).

¹Age here means age at last birthday; *i. e.*, 4 years includes children between 4 and 5, etc.

The tests were conducted in hallways or vacant rooms of the various school buildings, practically free from distractions. It was impossible to observe any uniformity in regard to time of day, the time ranging from 8.30 A. M. to 4.30 P. M. It is doubtful, however, whether this factor vitiates the results very materially, inasmuch as the tests almost never failed to enlist the interest of the child. The experiments of Thorndike and others indicate that undoubtedly existent fatigue does not materially influence a brief intellectual performance which holds the S's spontaneous attention. The time required for the tests was usually between 30 and 45 minutes, depending upon age, the number of tests covered and the promptness of responses.⁴ Extreme care was taken to win the confidence of the child and to rid him of any embarrassment before beginning the tests. Occasionally several minutes were consumed in this way.

The kindergarten children took all the tests from the third to the eighth year, inclusive. The others, with a few exceptions, began the series a year below the S's chronological age, or further back if necessary, and continued as follows: The first and second grade pupils generally through the ninth-year

⁴The testing of seven to ten pupils constitutes a day's work of five hours if the examination is made reasonably deliberate and thorough. In the opinion of the authors, tests carried through at the rate of 20 to 30 per day are sure to give unreliable and misleading results.

group, and in many cases through the tenth year. In the grades above the second, testing usually began with the eighth-year group, but farther back if necessary, and proceeded as far as the pupil could go. In some of the earlier tests a few were not taken over as large a range as was later covered, and some of our data, therefore, may not be absolutely complete. Discarding some of the more questionable records has left the data here included, the writers believe, not seriously deficient from this cause.

Too much emphasis cannot be placed upon the importance of securing uniformity of conditions and procedure in applying the tests. An apparently insignificant change in the wording of a question or of a preliminary explanation may influence the response very appreciably. It is inevitable that, in spite of all precaution, a preliminary study of this kind will contain some errors arising from this source, considering that even variations in the vocal inflection of different E's will influence the result. Elaborate instructions, however, were placed in the hands of each person who proposed to assist in the tests, and these were carefully studied before the work began. Moreover, the methods of different workers were occasionally checked up by comparison during the progress of the tests.

The detailed instructions used are too bulky for reproduction here, but were practically identical with those in Whipple's Manual, except on the following points:

(1) The test of "making change" involved the purchase of a 9-cent article and payment with a 25-cent piece.

(2) For the test of ability to name pieces of money the following eight coins were used: Penny, nickel, dime, quarter, half-dollar, dollar, five dollars (gold), ten dollars (gold).

(3) *Palo Alto*, *river* and *money* were the three words used for sentence construction.

(4) The following tests of "comprehension" were used in year five:

(a) What's the thing to do when you feel sleepy?

(b) What's the thing to do when you feel cold?

(c) What's the thing to do if it's raining when you start to school? (Two out of three correct.)

The following were used in year ten:

(a) What ought you to do when you have missed a train?

(b) What ought you to do when you have been struck by a playmate who did not do it purposely?

(c) When you have broken something which does not belong to you?

(d) When you have been detained so that you will be late for school?

(e) Before taking part in an important affair?

(f) Why does one excuse a wrong act committed in anger more readily than a wrong act committed without anger?

(g) What ought you to do when asked your opinion about someone whom you only know a little?

(h) Why ought you to judge a person more by his acts than by his words?

(Five out of eight correct.)

(5) Numbers 1, 2, 4 and 5 of Whipple's absurdities (see Whipple's Manual, p. 509) were used, and in addition the following: "There was a railroad accident yesterday, but it was not serious. The number of dead is only 48."

(6) In the tests of memory for sentences and also for digits one

(7) In the rhyming test "day" was substituted for "obey." Year 12.)

(8) The following "problems of fact" were used in year 12:

1. "There was a little boy who had never been to the city. When he was six years old his father took him to San Francisco. As soon as the boy saw the electric street cars for the first time, he said . . ." "What do you think the boy said?"

2. "My neighbor has just been having queer visitors: first a doctor, then a lawyer, then a priest. What's happening there?"

3. "An Indian, coming to town for the first time, looked very intently at a white man riding up the street. When the white man had passed the Indian said to his companion: 'White man lazy; him walk sitting down.' What was the white man sitting on?"

(1 and 3 are substituted for the rather too gruesome problems of Binet.)

An S's test age was computed by assigning him to the lowest year in which he passed all the tests, or all but one, and then crediting him with a half year additional for each three tests satisfactorily passed beyond this. In the seventh year four tests were considered as the equivalent of a half year. From the ninth to the twelfth years, inclusive, five credits were counted as equivalent to a year, and a remainder of three as a half year. This seems to be the only way of giving the tests of any year approximately equal value with those of any other year if Binet's method is to be adhered to at all. Even by this method the child often loses credit for one or two tests passed beyond the half year to which he has been assigned, but on the

other hand he often gains one credit where he fails in but one test of a given year. Binet's method of assigning credit is crude at the best. The changes here introduced below the ninth year tend rather to draw the results nearer to the Binet norm than away from it. A much more accurate method will be suggested in the last article of this series. ,

Another difference between the method here employed in reckoning test age and that followed by Binet and others touches a more fundamental point and deserves special consideration. In deriving the age norms for the various tests it seems that Binet reckoned chronological age by even years; that is, by 8-year-olds, he means all children between 8 and 9 years; by 12-year-olds, all between 12 and 13, etc. In other words, the median age for the so-called 8-year group is about $8\frac{1}{2}$ years. This is the most common procedure, is the one used also in our tests, and is perfectly legitimate, provided the facts are kept in mind. This means that what Binet designates as a characteristic performance of 8 years is really that of $8\frac{1}{2}$ years. It follows, therefore, that when an S (whatever his chronological age) passes as far as to the end of the 8-year group, and no farther, or if his performance is equivalent to this, then such S should be assigned a test age of $8\frac{1}{2}$ years. This was the method of computing used in this study, one which obviously throws our test ages one-half year in advance of those which would have been assigned by the method others have used. *This should be held in mind when comparisons are made of our results and those obtained by other studies.* The only logical way to avoid the necessity of adding on this half year is to group differently the S's to whom tests are applied for the sake of securing age norms. They can be grouped either by half years or in year groups separated by the half-year point. If we define the standard for 8-year mentality as the characteristic performance of non-selected S's lying between $7\frac{1}{2}$ and $8\frac{1}{2}$ years, then we can continue to use the Binet method of reckoning. Otherwise it is necessary to rename his standards as those for $6\frac{1}{2}$, $7\frac{1}{2}$, $8\frac{1}{2}$, $9\frac{1}{2}$ years, etc., instead of calling them, as Binet does, norms for 6, 7, 8, 9 years, etc. To illustrate the working of this, an S completing all the tests to the middle of the 8-year group would be ranked as testing 8

years. If he passes three additional tests either in this or the following years, he would be ranked as testing 8½ years.

RESULTS FROM TESTS OF 396 PUPILS.

Although, generally speaking, it is desirable to publish all the raw data from investigations of this nature, it is doubtful whether a preliminary excursion of this kind into a field where conditions and procedure have not been fully standardized warrants the expense and trouble of publishing the twenty or more pages which would be required for our material. We reserve this, together with a more thorough mathematical treatment of the data, for a later and more extended study.

The following table shows the distribution of *test ages* resulting from the application of the scale to the 396 subjects:

Age.	No. tested.	Variations of test age from chronological age.														Median age.	Median test age.
		+3.0	+2.5	+2.0	+1.5	+1.0	+0.5	0.0	-0.5	-1.0	-1.5	-2.0	-2.5	-3.0	-3.5		
4	29		8	13	4	3	1									4.75	6.5
5	83		3	14	31	24	5	5	1							5.5	7.0
6	26				2	9	7	7		1						6.37	7.0
7	29		1	1	6	6	4	8	2		1					7.5	8.0
8	43	2	1	3	2	6	6	7	6	7	3					8.5	8.5
9	49			5	6	5	6	13	8	3	3					9.5	9.5
10	33			1	3	5	5	7	5	3	4					10.5	10.5
11	44					1	3	10	7	11	5	5		2		11.46	10.5
12	35							2	10	7	7	3	2	1		12.33	11.0
13	17						3		2	1	8	1	3	1		13.42	11.5
14	6										1	3		2		14.58	12.5
15	2														2	15.2	12.0

Our data, so far as the Binet tests are concerned, are not at all conclusive for the thirteenth year, since we did not get the brightest pupils of this age for the reason that our tests were not extended into the eighth grade. The number of cases at fourteen and fifteen years is altogether too small to warrant any conclusions relative to these ages.

The following table shows a brief comparison of results by years and by grades:

TABLE III.						
Age.	Median age.	Median test age.	School grade.	Median grade age.	Median test age.	
7	7.5	8.0	I	7.5	7.5	
8	8.5	8.5	II	8.17	8.3	
9	9.5	9.5	III	9.33	9.5	
10	10.5	10.5	IV	10.0	10.0	
11	11.46	10.5	V	11.42	10.7	
12	12.33	11.0	VI	12.17	11.5	
*13	13.42	11.5	†VII	12.5	12.5	

*Based on rather limited data, 17 cases.

†Based on rather limited data, 15 cases.

The following chart represents graphically the relation between the median chronological and the median test ages, and throws into relief the periods of rapid, normal and slow mental growths as measured by the Binet scale. The points in the upper horizontal line represent chronological and median ages, and in the lower line test ages and median test ages. The connecting lines join the corresponding medians. When there is an identity in the two medians the connecting line is vertical. If an age group tests ahead of the chronological age, the connecting line slants to the right as it goes down; if the group tests behind the age, to the left. It will be noted that the chronological ages cover a range of nine years; the test ages but five years. In other words, the scale is far too easy at the lower end, while at the upper end it is too difficult. An S at the upper range is also at a great disadvantage in that he is not given opportunity to try tests beyond thirteen years.

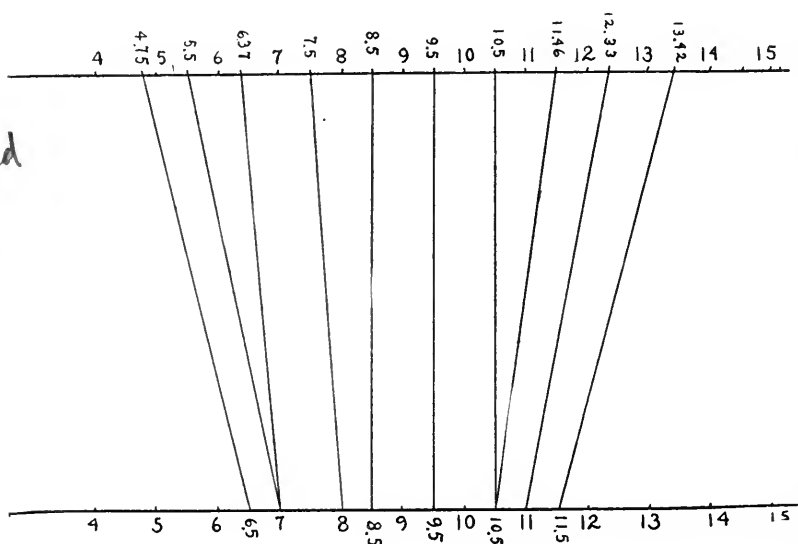


FIGURE I.—Upper line, chronological ages; lower line, test ages.

Charting the test ages as Dr. H. H. Goddard has done, by lumping all the ages together (see *The Training School for*

May, 1911), conceals, of course, the very facts we wish to know. From the above it is seen that the number of younger pupils testing ahead is about balanced by the number of older ones testing behind. What we want to know is how nearly accurate the scale is at every point. The following chart shows graphically how badly the scale fits California children of five and twelve years:

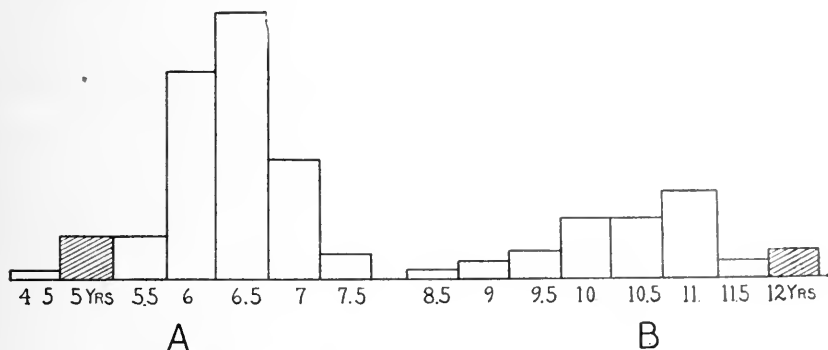


FIGURE II.—“A” shows the distribution of “test ages” for 83 five-year-old children; “B,” for 35 twelve-year-olds. In each case the number testing normal is indicated by the barred column.

Table IV shows the number of children tested at each age and the per cent. of those tested at each age who pass each test taken. A comparison with Binet’s scale will show how erroneously some of these tests are placed for use with American children. Our results indicate that for California children, at least, some of the tests will have to be moved as much as three years.

In the table where at any given year the number tested is but a small part of the whole number of that age the results should not be given serious consideration, for these represent either retarded older pupils who were given the lower year tests or the precocious younger children who were carried to a point far in advance of the majority of their age.

Further criticisms and suggestions are reserved for a later article.

TABLE IV.

This table shows the per cent. of those trying a test at any particular age who passed it. The figures in heavy type show the number of pupils of each age who tried each test.

IV.										V.										VI.											
Age.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.	
1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
4	29	100	93	100	93	29	97	86	90	90	97	29	41	80	31	86	29	41	80	31	86	31	86	31	80	31	86	31	86	31	
5	83	100	100	100	97	83	98	91	88	91	96	83	98	88	91	83	83	73	88	53	91	81	79	84	83	91	81	83	79	84	
6	18	100	100	100	83	20	95	85	95	90	85	24	75	83	62	83	24	75	83	62	83	87	96	87	90	80	90	95	95	100	
7	0	...	...	...	...	4	100	100	75	100	100	4	100	100	75	100	20	90	90	80	90	95	100	100	90	80	90	100	100	100
8	0	...	...	...	...	2	0	100	50	100	100	2	0	100	50	100	14	93	93	72	93	100	100	100	100	93	100	100	100	100
9	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	3	100	100	100	100	100	100	100	100	100	100	100	100	100
10	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...
11	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...
12	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...
13	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...
14	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...
15	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	...	...	...	...	...	...	...	...	...	...	...	...	...

VII.										VIII.																					
Age.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.		No. of cases.	
1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	7	8
4	29	0	0	65	0	29	0	0	34	0	34	29	34	0	23	17	44	29	34	0	23	17	44	29	34	0	23	17	44	34	17
5	83	0	3	74	1	83	0	3	47	1	47	83	68	33	10	53	50	83	68	33	10	53	50	83	68	33	10	53	50	38	38
6	26	0	11	84	7	26	0	11	47	7	47	26	57	73	42	61	42	26	57	73	42	61	42	26	57	73	42	61	42	77	53
7	29	20	58	96	62	29	20	58	55	62	55	25	68	92	100	92	72	25	68	92	100	92	72	25	68	92	100	92	72	53	72
8	43	51	60	100	69	43	51	60	65	69	65	35	82	97	100	91	74	35	82	97	100	91	74	35	82	97	100	91	74	60	88
9	45	89	73	100	95	45	89	73	89	95	89	12	83	100	100	92	83	12	83	100	100	92	83	100	100	92	83	100	92	100	92
10	20	90	85	100	100	20	90	85	100	100	100	1	100	100	100	0	100	1	100	100	100	0	100	100	100	100	100	100	100	100	100
11	14	86	72	100	93	14	86	72	100	93	100	2	100	100	100	2	100	2	100	100	100	2	100	100	100	100	100	100	100	100	100
12	6	100	83	100	100	6	100	83	100	100	100	0	...	...	...	0	...	0	...	...	...	0	...	...	...	...	...	...	...	...	...
13	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	0	...	...	...	...	0	...	...	...	...	...	...	...	...
14	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	0	...	...	...	...	0	...	...	...	...	...	...	...	...
15	0	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...	0	0	...	...	...	...	0	...	...	...	...	...	...	...	...

VII.

VIII.

TABLE IV.—Continued.

This table shows the per cent. of those trying a test at any particular age who passed it. The figures in heavy type show the number of pupils of each age who tried each test.

IX.						X.						XI.					
No. of cases.	1	2	3	4	5	6	No. of cases.	1	2	3	4	5	No. of cases.	1	2	3	4
0	...	...	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...
0	...	...	...	...	...	...	0	...	...	...	...	...	0	...	...	...	...
0	...	...	...	...	...	...	16	62	18	18	6	31	...	...	...	...	...
27	25	85	7	3	0	25	28	64	50	42	17	50	4	25	50	0	0
38	52	85	26	29	13	29	46	91	69	60	37	65	20	50	35	10	10
49	81	98	42	24	46	55	33	81	88	84	57	92	42	40	57	2	19
31	77	100	35	58	54	54	43	81	96	86	64	71	33	52	67	18	24
39	87	100	67	61	65	77	35	93	87	93	77	78	43	55	83	16	32
29	93	100	62	69	62	55	17	94	100	100	89	89	34	73	82	26	62
12	92	100	83	83	100	75	6	100	100	100	83	100	17	88	94	36	66
2	100	100	100	100	100	50	2	100	100	100	100	100	6	100	67	33	83
0	...	...	...	...	...	...	...	...	...	...	...	...	2	50	100	100	50

XII.						XIII.					
No. of cases.	1	2	3	4		No. of cases.	1	2	3		
0	...	...	...	...		0	...	...	...	...
0	...	...	...	...		0	...	...	...	...
0	...	...	...	...		0	...	...	...	...
3	0	100	0	0		0	...	...	...	...
14	28	85	42	7		0	...	...	...	...
27	29	74	29	18		0	...	...	...	...
28	46	92	35	35		0	...	...	...	...
37	43	81	37	40		8	25	...	...	...	25
34	38	82	41	41		19	15	...	...	...	30
17	36	89	54	48		9	22	...	...	...	55
6	83	100	67	100		5	40	...	...	...	60
2	50	50	100	100		2	0	...	...	...	50

EXPLANATION OF TABLE IV.

The Roman headings in the above table designate year group; the Arabic designate the individual tests in the following order:

IV—1. Sex. 2. Names familiar objects. 3. Three digits. 4. Comparison of two lines. 5. Sentences of ten syllables.

V—1. Weights. 2. Copies square. 3. Divided rectangle. 4. Counts four. 5. Fourteen syllables. 6. Comprehension questions.

VI—1. Right hand, left ear. 2. Aesthetic comparison. 3. Sixteen syllables. 4. Definitions of familiar objects. 5. Three commands. 6. Knows age. 7. Morning and afternoon.

VII—1. Omissions from pictures. 2. Number of fingers. 3. Writing from copy. 4. Diamond. 5. Five digits. 6. Description of pictures. 7. Thirteen pennies. 8. Four coins.

VIII—1. Reading for two memories. 2. Value of stamps. 3. Four colors. 4. Counting 20 to 0. 5. Writing from dictation. 6. Comparison of things.

IX—1. Names date. 2. Days of week. 3. Makes change. 4. Definitions superior to use. 5. Six memories. 6. Weights.

X—1. Names months. 2. Nine pieces of money. 3. Three words in sentence. 4. Comprehension questions. 5. Six digits.

XI—1. Absurd statements. 2. Sixty words in two minutes. 3. Defines abstract terms. 4. Disarranged sentences.

XII—1. Seven digits. 2. Rhymes. 3. Twenty-six syllables. 4. Problems of fact.

XIII—1. Draws from design in folded paper. 2. Reversed triangle. 3. Distinctions between words.

MENTAL FATIGUE IN DAY SCHOOL CHILDREN AS MEASURED BY IMMEDIATE MEMORY. PART II.

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SUMMARY.

Tests of immediate memory on a class of fifty-one boys, averaging eleven years of age, showed a slight relative inefficiency in the work of the late afternoon as compared with that of the early morning. The decrease in efficiency was about two per cent.

IV. A SECOND EXPERIMENT IN A BOYS' SCHOOL.

This experiment was carried out with the whole of a Standard IV class, numbering 51, of an average age of 11 years, 1 month, on June 30, 1911. The school was the same as that in which the previous experiment was done, but the standard of mental proficiency and the age of the boys were different and they were taught by a different teacher. This class was also taught by a young man of capacity, but differing from the teacher of the preceding class somewhat in the greater evenness, though, perhaps, slighter intensity of his demands upon the mental energy of his pupils.

i. Tests and Method of Marking.

The tests were tests of memory of auditory percepts. Six consonants, for example, r, l, p, x, m, s, were called out twice in 25 seconds by the teacher of the class, whose voice and enunciation were familiar to the children. A slight pause was made after each consonant with a slightly longer pause after the third. One minute five seconds was allowed for the boys to write out as much as they could remember of each set of con-

sonants immediately after they had been called out. They were required to write them in two lines of three consonants each. Ten sets of consonants constituted one test or exercise, the whole procedure lasting exactly 15 minutes. The boys' papers of answers were marked exactly as in the preceding experiment. Three marks were given for each consonant correctly remembered and rightly placed; two marks, if the consonant were rightly remembered, but was one place before or behind its proper position; and one, if it were two places out. As before, the children were instructed to leave a space in the place of any consonant which they knew they had forgotten.

ii. *Chronology of the Series.*

Four sets of preliminary tests were given to afford a basis for the division of the class into two equal groups. They were worked from 10.45 to 11 A. M. on Tuesday, June 13; Wednesday, June 14; Friday, June 16, and Tuesday, June 20.

The school lessons which preceded these preliminary tests were in all cases the same, namely, Scripture, arithmetic and recreation, so that no difficulty arises on that score, but I regret that the exigencies of the school work in relation to the forthcoming coronation festivities prevented me from spreading the work over a longer period and, above all, of getting more regular intervals between the successive tests. Coronation holidays followed immediately upon the preliminary tests, and it was not until some twelve days afterwards that the school once more settled down to work. In the interim the boys taking the experiment had been divided into two equal groups on the results of the preliminary tests and henceforward one of the groups continued the tests in the mornings from 9.45 to 10 A. M., whilst the other group worked the same tests in the afternoons of the same days from 4 to 4.15 P. M.

Four of these tests were given—henceforward called the final tests—on Wednesday, July 5; Friday, July 7; Wednesday, July 12, and Friday, July 14.

The lessons which preceded the morning tests were in each case Scripture lessons: the lessons which preceded the afternoon tests were, on Wednesdays, arithmetic, physical exer-

cises and reading, and on Fridays, English, physical exercises and history.

Whilst Group A were working their tests in the morning, Group B, in another room, were drawing common objects, and whilst Group B worked their memory tests in the afternoon Group A drew common objects. The children in both groups were told the results of their previous work both in drawing and in memory work before proceeding to the next test.

In every respect other than those just indicated the timetable of school work for the two groups was precisely the same throughout the period of the experiment.

iii. *Results.*

It is of little value to attempt to divide a class into equal groups on results which vary so much from exercise to exercise that the children seem to be jumping about in the lists and rapidly exchanging places. An inspection of the results will give a fairly good notion as to the "steadiness" of the work, but, of course, a calculation of a coefficient of correlation enables more careful comparison to be made. Calculated on the moment-product formula $r = \frac{\sum xy}{N\sigma_x\sigma_y}$, the correlation coefficient between the results of tests 1 and 2 is + .743, of tests 2 and 3 is + .741 and of tests 3 and 4 is + .746. With correlations of this size and a number of cases amounting to 51, the "probable error" of the coefficient of correlation is practically negligible. I decided to make the division on the results of these four tests, but I was well aware that I had not divided the class in the case of the previous experiment until the positive correlations between the results of successive tests had become decidedly higher than these, and I should have continued the preliminary tests had not the coronation holidays stood in the way. It is probable, therefore, that the division into equal groups is not so satisfactorily effected as in the case of the previous experiment. That it is fairly satisfactory, however, will appear from tables which follow.

I propose first to show the work of the two groups as wholes both in the preliminary and final tests.

*TABLE I, *Showing the Work of the Two Groups as Wholes, Test by Test, in Both the Preliminary and Final Tests.*

		Preliminary Tests.				Final Tests.			
		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
Group A.	Av. mark....	15.4	16.1	16.0	16.0	16.6	16.2	16.4	16.9
	M. V.....	1.4	1.2	1.5	1.4	1.2	1.6	1.2	1.1
Group B.	Av. mark....	15.2	16.2	16.0	16.0	16.0	16.1	16.1	16.3
	M. V.....	1.4	1.3	1.6	1.2	1.4	1.1	1.2	1.3

The average mark for the whole of the preliminary tests for Group A is 15.9, with a mean variation of 1.2, and for Group B is also 15.9, with a mean variation of 1.2. In the final tests Group A scores an average mark of 16.5 (mean variation 1.1) and Group B an average mark of 16.1 (mean variation 1.1). Group A—the morning group—improves on its preliminary record to the extent of 3 per cent.: Group B—the afternoon group—improves on its preliminary record to the extent of 1 per cent. There is apparently an advantage of 2 per cent. in improvability of the morning over the afternoon workers.

There are one or two comments which may usefully be made on the above table. It will be noticed how little improvement is shown in the preliminary tests, even though the exercises are quite new. But surprise will no longer be felt when it is remembered that they were all worked within the space of seven days. An improvement in mental work of this kind is very little evident unless there are suitable intervals between the successive exercises. It will also be seen that the morning group did better work in each of the final tests as compared with the group of afternoon workers, though, in one case, the difference is slight.

I next propose to show, section by section, the work of the two groups in the preliminary and final tests respectively.

*The calculations are made to the nearest ten.

***TABLE II, Showing the Work of Groups A and B Compared, Section by Section, in the Work of the Preliminary and Final Tests, Respectively.**

Marks for four preliminary tests.		Group A.		Group B.	
		No. of boys.	Av. mark per boy per test of four prelim'y tests.	No. of boys.	Av. mark per boy per test of four prelim'y tests.
Over 65.....	12	17.1	17.5	12	17.1
Over 60.....	7	15.8	16.7	7	15.7
Over 55.....	2	14.0	15.5	2	14.6
Under 55.....	4	13.3	13.8	4	13.1

There appears to be some advantage on the side of the early morning workers in the first, second, and third sections; but in the lowest sections, consisting of boys who obtain less than 55 marks in the four preliminary tests, the group of afternoon workers show more improvement than those who work early in the morning. This is contrary to the suggestion, previously made, that, perhaps, it is the more strongly endowed who do better work in the afternoon, for these boys are among the weakest in the class mnemonically, as shown by both the preliminary and final tests. The differences between the improvements shown by the morning and afternoon workers appear small. This may be partly due to the fact that the tests were a little too easy. Eighteen (or rather one hundred and eighty) is the maximum mark per test and it will be at once seen that in the highest sections, which score 17.1 marks in the preliminary tests, that there was not very much room for improvement. I propose, finally, to show the comparative improvements of the individual pupils of Group A and Group B. The improvements are calculated on the average of the four preliminary tests on which the class was divided. The averages and percentages are calculated to the nearest unit only.

*The calculations are made to the nearest ten.

TABLE III, *Showing the Comparative Improvement of the Pupils in Groups A and B in the Morning and Afternoon Work, Respectively.*

Group A.				Group B.			
Name. (Initials only.)	Av. of four prelim'y tests.	Av. of four final tests.	Percentage of im- provement.	Name. (Initials only.)	Av. of four prelim'y tests.	Av. of four final tests.	Percentage of im- provement.
I. F.....	177	176	— 1	S. S.....	177	180	+ 2
F. C.....	172	179	+ 4	W. V.....	175	174	— 1
F. G.....	171	174	+ 2	M. A.....	174	174	0
R. D.....	173	173	0	G. H.....	172	170	— 1
G. E.....	172	176	+ 2	O. S.....	172	178	+ 3
P. A.....	170	170	0	W. W.....	172	177	+ 3
P. G.....	168	173	+ 3	R. R.....	170	169	— 1
F. W.....	170	176	+ 4	P. W.....	168	175	+ 4
F. A.....	164	176	+ 7	N. L.....	165	162	— 2
H. W.....	168	173	+ 3	S. W.....	165	159	— 4
R. H.....	167	175	+ 5	O. S.....	166	154	— 7
K. J.....	164	166	+ 1	McW.	164	171	+ 4
S. A.....	162	179	+ 10	S. T.....	161	161	0
H. J.....	160	168	+ 5	P. A.....	158	155	— 2
D. A.....	157	163	+ 4	H. W.....	160	169	+ 6
C. L.....	155	165	+ 6	D. R.....	159	172	+ 8
A. J.....	158	167	+ 6	C. J.....	153	163	+ 7
S. K.....	155	158	+ 2	M. A.....	153	144	— 6
E. W.....	154	162	+ 5	N. W.....	151	160	+ 6
N. W.....	138	144	+ 4	McI. F....	148	152	+ 3
W. E.....	142	164	+ 15	H. C.....	143	151	+ 6
W. E.....	136	147	+ 8	B. T.....	136	136	0
B. S.....	133	148	+ 11	D. H.....	131	154	+ 18
W. F.....	132	126	— 5	H. E.....	130	136	+ 5
H. A.....	127	128	+ 1	R. F.....	123	132	+ 7
<hr/>				<hr/>			
Totals...	3945	4106		Totals...	3946	4028	
Averages.	157.8	162.2		Averages.	157.8	161.1	
M. V.....	11.9	11.1		M. V.....	12.2	11.2	

An inspection of the table shows that in the group of morning workers improvement is shown in every case but four, whilst, in the afternoon group there are 11 such cases; but probably comparisons of this kind may be made more readily from the following tabular statement.

TABLE IV, *Showing the Comparative Percentages of Improvement Between the Members of Group A and Those of Group B.*

	Number of Cases.	
	Group A. Morning Group.	Group B. Afternoon Group.
Gain of 15% and over.....	1	1
Gain of 10% to 15%.....	2	0
Gain of 5% to 10%.....	7	7
Gain of 0% to 5%.....	11	6
Neither gain nor loss.....	2	3
Loss of 0% to 5%.....	2	6
Loss of 5% to 10%.....	0	2

The coefficient of correlation on the total results of the four preliminary tests between the corresponding cases (see Table III), of the two Groups A and B is, of course, as estimated by rank formulæ + 1. On the moment-product formula, which uses marks, not rankings, the coefficient is + .899. Similarly calculated, the coefficient for the final tests is + .862.

V. SUMMARIZED CONCLUSIONS.

1. Again we find that the use of immediate memory tests indicates, in a normal group of school children constituting the whole of a class or grade, a certain amount of relative inefficiency in late afternoon as compared with early morning work.

If we accept this relative inefficiency as a measure of fatigue for mechanical memorizing it appears to be very small for children of this age and mental proficiency, namely, about 2 per cent. Unfortunately, however, the tests set were relatively, as well as absolutely, easier than those given to the older and abler boys who took the previous experiment, so that I feel very little confidence in making the suggestion that with lower classes the fatigue effects for purely mechanical work may be smaller than in higher ones. In any case the fatigue effects for mechanical mental work of this kind appear small amongst children, at least so far as boys of this type are concerned.

2. As in the class previously dealt with there are to be found children who cease to improve and tend downward. It is not argued that no fatigue is present if improvement continues, indeed, I have tried to measure fatigue by differential improvements made under differing conditions; but it is ar-

gued that an actual deterioration in work of this kind shows such fatigue that there are indications to the educationist of the advisability of a cessation for a time of that or other work or what amounts to much the same thing, of a longer interval between the successive exercises. Two of the morning workers and eight of the afternoon workers appear to have deteriorated during the course of the work. With one-third of the afternoon group, therefore, the work appears to have been futile, as was found to be the case in the previous experiment. On the other hand a considerable proportion of the children have continued to improve.

3. The ordinarily accepted pedagogical maxim that, with most children, mental work of a mechanical kind may be done, with fair satisfaction, late in an afternoon session, appears to receive some corroboration.

ADDING UPWARD AND DOWNWARD.¹

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SUMMARY.

Measured by averages, twenty-nine out of a group of thirty^{1a} persons, selected at random, added the same problems more rapidly and less accurately when adding upward than when adding downward. Counting to the left was also slower and more accurate than counting to the right. This is apparently due to a habit acquired by reading from left to right. In both experiments the factor of habit seemed to produce a saving of time at the expense of accuracy. The subjects of the experiments were persons of average practice in adding. Probably a very great amount of drill in addition (perhaps more than a school program could allot to it) would be required before results of the opposite type would emerge and the adding process become both mechanical and accurate.

INTRODUCTION.

A statement by Professor Muensterberg² concerning "the considerable time differences between even the simplest subtraction and addition processes" led me to think it possible that school training in arithmetic may give to a majority of pupils a habit of adding *upward* which would make it impossible for them to add the same columns as rapidly *downward*. Should this prove to be the case, it seemed possible to ascertain what proportion of the effect of practice is due to central processes and what part due to peripheral ones. Unless my ran-

¹My thanks are due to my assistants, Mr. C. I. DeVoss and Miss Mary Lakenan for valuable help in the experiments.

^{1a}Five other persons took the preliminary test; hence I mention 35 below.

²Psychology and the Teacher, p. 235.

dom selection of thirty-five persons is an exceptional one, or the number of persons too few, the experiments seem to show that such a habit often exists, and this appears from the record of the time averages, of accuracy, of persons, and from the decrease of reversals of the habitual time relation with an increase of adding time. Until after experiments began I did not expect to find a greater difference in accuracy than in time between upward and downward addition.

METHOD.

Preliminary Test: In a preliminary test five persons, four advanced students of psychology and the writer, each added four five-column problems and four six-column problems, twenty figures in length, both upward and downward. The order of the additions was such as to give no advantage to either the upward or the downward process. Defects in this test led to the arrangement of Tests A and B for further work.

Test A: This consisted of twenty single columns, forty figures in length, so arranged that those designated by the odd numbers, 1-19, inclusive, were to be added upward, and those designated by the even numbers, 2-20, inclusive, were to be added downward, but the subject added the columns in consecutive order from 1 to 20. By this arrangement columns 1 and 12, 2 and 11, 3 and 14, etc., which were the same, were added in opposite directions. So not fewer than eight nor more than eleven columns intervened between any two to be added in opposite directions. Of those to be added in opposite directions half were first added downward and half were first added upward.

On the same page with these typewritten columns there was a preliminary exercise in three-column addition, twenty figures in length, to be added, first upward, then downward. This was done in order to be sure that the subject understood the directions given him, and in the hope that any initial flurry or embarrassment would be overcome during this exercise. The times required to get these two sums were recorded, but used no further.

Test B: In Test A the ten columns to be added upward were

identical with the ten to be added downward. Hence, in an upward addition, the subject would add 2, 6, 3, etc., and in the corresponding downward one 3, 6, 2, etc. As measured by time, accuracy and "reversals" (and somewhat vaguely by introspection) these two processes are not quite the same. Consequently, in Test B the columns to be added downward *were inverted*. So in both the upward addition and the corresponding downward one the subject added the successive figures *in the same order*. In other respects Tests A and B were the same.

Since the combinations to be made in the upward and downward columns of Test B were the same, and made in the same order, the only objective difference between the two types of addition was a difference *in the direction of the movements of the eye and hand*. Aside from fluctuations of attention, this difference would seem to be the cause of all differences in the results of the adding.

Test C: This experiment was not designed to test the effect of an addition habit, but of the habit acquired by reading from left to right. It consisted of two series, each of one hundred lines (more exactly the line used in typewriting to separate the numerator and denominator of a fraction; it is much like a plain figure 1). The first series was to be counted "by ones" from left to right; the second in the opposite direction. This, like Test B, involved objectively only a reversal of the habitual movements of hand and eye. Despite the small number of lines to be counted, the differences, both in time and accuracy of counting the two series, were relatively great.

Test C was doubtless defective in that it might suggest to some subjects that the lines to be counted leftward were the same in number as those which had just been counted to the right.

Method: In every case the experiment was made in a quiet room and the times carefully taken with a stop-watch. The subject was not urged to add "as quickly as he could," but he was directed to add as rapidly as possible without a sacrifice of accuracy. This, with the knowledge that his time was being recorded, served to arouse a strong effort to add both rapidly and accurately.

The same thirty persons took all three tests. Tests A and B were not given to the same person on the same day. The majority of the subjects were sophomores in college. Three or four were juniors and seniors. Twelve were men, eighteen were women.

RESULTS.

Preliminary Test: The result of this experiment, in which five persons participated, showed that adding the six-column problems *downward* required an average of 15.3 per cent. more time than adding the same columns upward, while the downward addition of the five-column problems required 10.5 per cent. more time than their addition upward. Each average is obtained from the addition of twenty problems.

In the total of twenty pairs of problems there occurred only three "reversals," or cases of more rapid downward than upward addition. The records of these reversals are included, however, in the averages, which they reduce but slightly. One reversal was by a margin of 4 seconds, another of 8, and the third of 60 seconds. *The amount of error was less for adding downward.*

This test included two types of association, namely, "carrying" and adding. An error in the tens column had ten times as great a value as the same error in the units column, and carrying prevented reducing such errors to a common basis. As a final objection to the test, it required too much time to be given to a considerable number of persons. Aside from these defects, it served to differentiate the results of upward and downward addition very clearly. Nevertheless, I felt compelled both to shorten the time and to eliminate "carrying." After some further investigation I decided to depend on the difference of time between the upward and downward addition of ten single columns, each forty figures in length. A "reversal" in this case would mean that more time was required to add ten columns upward than downward. To fulfil these conditions Tests A and B were arranged. Each of them demanded about twenty minutes of adding by each subject, with a brief interval between each two consecutive columns.

Fortunately, in order to determine the suitability of this amount of time, I can compare its effect on reversals with both a briefer and a longer period. This will at the same time give the results of the experiments as shown by reversals.

Reversals: When the time required to add a single column in both directions (the average time for this was 2 minutes, strictly 119.4 seconds) was used, reversals of time occurred in one-third of the pairs of columns. When measured by the time required to add *ten* columns in each direction (which averaged 20 minutes, or strictly 1194 seconds), reversals occurred in one-sixth (strictly 9/60) of the cases. If the addition was continued for an average time of 24 minutes and 22 seconds for each person, as in the five- and six-column addition (complicated by carrying), the reversals amounted to only one-seventh of the total number of pairs of problems added. It appears evident from this that in a group of persons who have formed the habit of adding more rapidly upward than downward the number of reversals, or cases of adding more rapidly downward than upward, can be made as few as we please by lengthening the columns to be added. My selection of ten columns, or about twenty minutes of adding time, therefore seems fair, though thirty minutes would have shown the effect of habit much more clearly.

The facts stated above may be tabulated as follows:

Unit.	Ratio of pairs of additions reversed to all pairs added.	Adding time.
Pairs of single columns.....	1/3	2 minutes.
Ten columns in each direction.....	1/6	20 minutes.
Five- and six-column addition of the preliminary test.....	1/7	25 minutes (nearly).

In one of the reversals of the twenty-minute period the subject was disturbed by hearing the signal for his next class. In another the subject felt sure her reversal was due to a headache produced by having arisen at 5 A. M. to play tennis. Like several others, these two persons reversed in Test B, but not in A, which they had taken on a previous day.

These facts seem to indicate that many of the reversals, and perhaps all but two, which were due to habit,³ were caused by

fluctuations of attention. These, being momentary, would have far greater relative effect in very brief adding times. There seems to be no doubt that the shorter time for addition upward, which occurred in five-sixths of the pairs of twenty-minute additions, was due to a habit acquired when learning to add or when practicing for efficiency. Its influence on most of the pairs, whether measured by reversals, by time averages or by accuracy, would tend to show that the habit is not a momentary or intermittent cause, but a fairly constant one.

Record by Persons: In all, four persons gave reversals in Test A, seven in Test B. One person who reversed the time in one test is a stammerer. Two persons used the same time for the upward and downward work of Test A. Hence, of thirty persons, twenty-four added more rapidly upward than downward in Test A and twenty-three in Test B. Only one person was found who adds downward habitually and reversed both tests.

Time: The average time required to add a single column (forty figures) of Test A upward was 59.1 seconds, downward 61.3 seconds, or the average for each subject was 22 seconds more time required to add the downward than the upward half of the test, notwithstanding the records of four persons who added more rapidly downward are included in the averages.

The same averages for Test B were: upward, 58.3 seconds; downward, 60.2 seconds; difference, 1.9 seconds per single column, or adding the downward half of the test required 19 seconds longer for each person than adding the upward half. Here the records of seven persons who added a trifle more rapidly downward are included in the averages, and, of course, make them approach each other in amount.

It will be observed that inverting half the columns of Test B, so that the same associations appeared in the same order, saved .8 of a second on each single column of upward addition and 1.1 on each single column of downward addition. These differences probably represent the gain from adding a vestige of "immediate memory" to permanent memory. It seems evi-

*As stated later, one person was found who habitually adds downward.

dent that the subject adds 3, 6, 7, etc., more quickly from having added the same figures *in the same order* about twenty minutes before, but he does not add 3, 6, 7, etc., more quickly from having added 7, 6, 3 about twenty minutes before. I say a "vestige" of immediate memory, for after adding a column in one direction the subject had to add at least *eight* other columns before adding the same one in the reverse direction. While in general immediate memory demands that no impressions intervene to efface the immediate one, it appears from these slight but consistent gains that immediate impressions do not fade so rapidly that they cannot slightly shorten the time for forming the same associations (*i. e.*, combinations of the same data in the same order) a few minutes later. The differences in time are, it is true, of small magnitude, but they could be increased either by lengthening the columns or by using more than single-column addition for the test.

The average time for adding a single column is based on the addition of ten columns upward and ten downward in each test by each of thirty persons. Or the average in each test is derived from the addition of 600 single columns, 300 of which were added upward and 300 downward. But since the averages of *both tests agree that downward addition is the slower process*, that conclusion is based on the addition of 600 columns (23,400 separate associations) in each direction. Unless my group of thirty persons is an exceptional one, it is probable that the schools give considerably more practice in upward than in downward addition.

I have stated that the only objective difference between adding the upward and downward halves of Test B was a reversal of the habitual direction of the movements of eye and hand. These *motor* differences must, therefore, be the cause of the differences in time and accuracy in the two types of addition in this test. Test B involved only these motor factors, and Test A included these factors and a central one, namely, the different order of the associations to be made in the upward and downward adding (*i. e.*, 2, 8, 7, etc., upward; 7, 8, 2, etc., downward). Obviously, then, if we subtract the time required for Test B from that required for A, we shall have the time required for the central process of Test A, exactly as we com-

pute discrimination time by subtracting the time for the simple reaction to one signal from the longer time required to respond to a certain one of two signals.

The average difference per single column between adding upward and downward in Test B was 1.9 seconds; in Test A, 2.2 seconds. The difference of .3 of a second per single column in favor of Test B is due to the opposite orders of the combinations of digits to be made in the upward and downward additions of Test A. The difference is slight, but this is explicable on the ground that the average person has probably had quite as much practice in combining 2, 6, 7, etc., as in combining 7, 6, 2, etc. It seems probable, therefore, that so far as these two types of association are central, or unmodified by the immediately preceding perceptions, they require practically the same time, and that this is due to habit alone. At most the average difference in pure association time in the two cases was but 7 sigma. Hence, practically all the difference in time in favor of upward addition was due to peripheral causes, *i. e.*, to difference in the rates of perceiving the numbers.

Accuracy: So far I have discussed the time relations of upward and downward addition, but downward addition is the more accurate of the two processes. This leads to the inquiry, How does the single objective cause (Test B) operate to produce slower downward addition? There appears to be but one answer to the question: (1) The slower movements of eye and hand downward cause (2) a slower perception of the figures, and the associations are delayed merely by (3) having the data for combinations delivered to them more slowly. The figures of the tests were distinctly typewritten and in true vertical alignment. There were double vertical spaces between the lines. Hence, there could hardly have been either delay or inaccuracy in perception itself, but only in perception as depending on (waiting for) the preceding motor processes.

In Test A 54 per cent. of the total error was made in adding upward, 46 per cent. in adding downward. In Test B the averages were 51.8 per cent. and 48.2 per cent., respectively. Thus greater accuracy resulted from the slower (downward) addition in both tests, and while adding downward was more rapid in B than in A, it was also less accurate.

These results confirm the introspective belief that in the same person of average practice calculation is more accurate when it is performed more slowly. In other words, the results support the popular maxim, "Slow but sure." Since educational theory appeals nowadays to experiment rather than to experience, and is divided on the question of the appeal to voluntary attention, it seems possible that an experiment which shows that even momentary increase in effort of attention results in greater accuracy of associations is not without value.

Should it be found true that the perception of written figures is, in most persons, a more rapid process than associating them into partial sums, a condition which slows the rate of perception might make the associations clearer, more conscious and more accurate. Adding downward when one habitually adds upward would be one such condition. Voluntarily slowing the rate of perception to make the combinations more certain would be the same thing, except that it is subjectively caused. If, on the contrary, the figures could be combined into partial sums as rapidly as they could be perceived, very rapid addition should result in greater accuracy. This may be the case in persons who have had a great deal of practice in addition. But in either case greater accuracy would seem to result from having the perception of the figure and its association with the partial sum occur at the same moment. In our experiments with persons of average practice, therefore, it seems probable that the slower, downward addition was more accurate because it produced better co-ordination of perception with association.

In his investigation of counting and adding Arnett⁴ found that "the cause of such errors as were made seemed to lie very frequently in the influence of some preceding figure still *delaying in the mind*. Burgerstein, in his studies of Vienna school children, found this to be one of the most common causes of error both in addition and multiplication." This language implies that each figure perceived arouses a mental duplicate of itself which may "delay in the mind." In persons practiced in addition this mental duplicate may not arise, but only the partial sum. Is it not possible that these two types of

images take the place of what, in addition to other data, is called the "anticipatory image?" And may not the difficulty of accurate addition lie in the fact that here the image can no longer be "anticipatory" nor "delayed," but must be accurately timed to meet the perceptions? Introspection tends to confirm this view, since one type of mental confusion is felt to be an experience of too many impressions coming at once.

The opinion that a habit of adding more slowly downward may have been formed because such adding is done to verify or prove the result of adding upward seems to be contradicted by the counting test. (See "Results of Test C," p. 93.)

Assuming now that there are two factors, habit and fluctuations of attention, involved in adding upward and downward, and that the fluctuations of attention work intermittently or momentarily, then if a majority of the subjects of the experiment have practiced adding upward more than downward, the effect of habit should appear in five ways:

(1) A majority of the group should add the same columns more rapidly upward than downward.

(2) There should be fewer "reversals" than cases of the habitual time relation.

(3) But it should be possible to increase the proportion of reversals by decreasing the adding time, and to decrease the number by increasing the adding time. For a momentary, intermittent cause, like fluctuations of attention, must have greater relative effect if the adding time be momentary.

(4) The average time of the whole group of persons must be less for upward than for downward addition.

(5) Finally, greater accuracy should appear in the slower downward adding.

Since all five of these results appeared consistently in our experiments, the temptation lies near to claim that but two factors are present in adding, habit and attention, and that the former is more effective for speed, the latter for accuracy. Yet while the two factors are thus oppositely related, no effort of attention can obscure the effect of habit for more than five or six minutes at a time. Introspection agrees with this con-

clusion, and perhaps the reader will add that introspection reveals all the facts stated. I must reply that very few of my subjects had the slightest introspective knowledge of their habit of adding upward, and many of them overrated their ability to overcome the effect of habit by attention.

Results of Test C: If downward adding is in most persons both slower and more accurate than the same addition upward, what will be the effect of reversing our habit apparently acquired by reading from left to right? Each of the thirty persons who took Tests A and B was asked to take Test C. This consisted of counting "by ones" one hundred lines from left to right and an exactly similar series from right to left. While four persons used the same time in both directions, and two counted to the left a trifle more rapidly, the average individual time was 34.4 seconds when counting to the right, 37.1 seconds when counting to the left. The total error of all subjects when counting to the right was 62, when counting to the left 36. Hence, the reverse of the ordinary process is, in this case, as in addition, both slower and more accurate than the direct or usual process. The averages of all the tests point, therefore, to the same conclusion.

Arnett⁵ says: "A greater degree of certainty was felt in counting from right to left than in the reverse direction, but no reason for this was discovered." The "reason" is doubtless the greater accuracy, and the introspective report is correct in this case.

CONCLUSIONS.

The agreement of the statistical results is stated on page 92.

1. Neural "paths" appear to be polarized by habit. So far as these experiments go the effect seems to be greater in peripheral paths than in central ones.

2. The effect due to the reading habit appears to be stronger than that due to the addition habit, since it is appreciable in a much briefer experiment. The average time for Test C was but 71.5 seconds.

⁵Counting and Adding. Amer. J. of Psych., Vol. 16, No. 3, 1905, p. 329.

3. Twenty-nine of our group of thirty persons gave evidence of an upward adding habit. One had formed the reverse habit.

4. For these persons of average practice a condition which increased the time even slightly resulted in greater accuracy in adding and counting.

5. There is some evidence to suggest that accuracy in addition depends upon the co-ordination of *equally conscious* or *equally mechanical* perceptual and associate processes; inaccuracy upon the co-ordination of a mechanical perceptual process with a conscious associative one.

6. Had a larger number of habitually downward-adding persons shared in the experiments, no correlation between time and the direction of adding would have appeared. Quite the same for accuracy and direction. Finally, accuracy and rate of adding have been found to stand in the relation of positive to negative. These facts help to show the extreme importance of Professor Judd's^o demonstration that positive and negative cases often cancel each other, thus giving an appearance of no correlation where it can be shown to exist.

^oThe Relation of Special Training to General Intelligence. *Educational Review*, June, 1908, p. 28ff.

COMMUNICATIONS AND DISCUSSIONS.

A SUGGESTION FOR THE IMPROVEMENT AND EXTENSION OF MENTAL TESTS.

The present interest in mental¹ tests, particularly tests for deviations from the normal, means much for the future of education. There is one aspect of the matter to which I wish to direct attention. There is not in the Binet tests or any of the modifications yet proposed, sufficient system—no common plan running through the tests for the successive years. Prof. Terman's modifications and additions correct many of the most glaring defects of the Binet tests. There are some suggestions concerning the form of the tests and the method of stating the results obtained from them, which I wish to offer. These tests have been used to determine the number of years of retardation of the mind as a whole. Prof. Terman proposes, for instance, to take the child being examined as far as it can perform the tasks, then by adding up the tests successfully passed, determine the age of development represented by the child. Now, if we shift our attention from the mind as a whole to the mind as made up of several different functions, traits or capacities, it appears that the whole scheme of these tests and the statement of their results should be different. We should plan a series of tests for determining the degree of development of logical memory, rote memory, attention, imagination, association, and two aspects of mind more complex, learning capacity and reasoning. Even granting that the Binet tests may soon be made about perfect, they would still have to be changed very soon, for they are certain to come into a much more general use and their nature will soon be common property to school children. It seems to me that we need a national committee having authority to plan annually tests for the more important mental traits, and determine the normal performance for the successive ages. Take logical memory, for example, two short selections would be sufficient for all the different ages. But two or three supplementary tests should be prepared and standardized. In

the same way tests should be prepared and norms determined for attention, rote memory, imagination, etc. It is more important, it seems to me, to know specifically the condition of the child with reference to the development of the separate mental traits than to know his average performance with respect to them all. I am much in sympathy with Prof. Davenport² in his consideration of imbecility from the point of view of unit characters and heredity. What we wish to know is *whether and to what degree a specific mental trait is present*. To know that an eight-year-old child is two years backward does not mean much, but to know that he has poor logical memory, poor attention, or poor association, means much just as it means much to know specifically concerning the eyes, ears and other special organs.

I have in mind, also, a much more extended use of these mental tests than they have yet been put to.³ From the time when a child enters school till he leaves it, accurate tests of his mental development should be made and careful records kept. The application of the Binet scale up to the present time has been chiefly to those children already picked out as abnormal, and probably in need of special training. If educational procedure is ever to be scientific, we must make accurate tests and keep the records, and this must be done for every child.

W. H. PYLE.

University of Missouri.

EDUCATION AT THE WASHINGTON MEETINGS.

The annual meetings of Section L, Education, were held at Washington Thursday and Friday, December 28th and 29th, as part of the sixty-third meeting of the American Association for the Advancement of Science. Thursday was devoted to general subjects—the new college entrance requirements in the morning, science teaching in the afternoon—while on Friday were given many short reports of scientific topics, or of investigations along educational lines. The Thursday morning meeting was a joint session with the American Federation of Teachers of the Mathematical and Natural Sciences, and on Friday afternoon the Section met with the American Psychological Association.

¹For recent discussions see page 101 of this issue of the JOURNAL.

²C. B. Davenport. *Heredity in Relation to Eugenics*. New York: Henry Holt & Co. 1911. See also, G. M. Whipple, *Manual of Mental and Physical Tests*, 1910, p. 2, and my *Outlines of Educational Psychology*, 1911, p. 28.

³I have discussed this point and given a scheme for making the tests and keeping the records, in the *Outlines*, p. 236.

The reports of Prof. Jones for Columbia, Prof. Moore for Harvard, and Prof. Angell for Chicago on the changes in the entrance requirements were followed with close attention and many questions were asked of the speakers. Columbia proved the most conservative of the three, the real essence of the changes being that the university proposes to interpret its entrance examination grades in the light of the candidate's past record as supplied by the school. At Harvard the new scheme does not replace the old, but is simply an alternative plan whereby a good student from any school may be able to enter college although his school course has not been specifically modelled along Harvard lines. The entrance committee recognizes three factors in its decisions—the course of study pursued, the record made by the candidate, and the quality of his work as revealed by four examinations in standard subjects, which are designed to test, not the possession of specific information, but the quality of his mental powers. Any one of the three may be the deciding factor, each case being considered on its own merits.

The changes at Chicago proved the most radical of the three. By inspection from time to time, by records of the success or failure in college work of any school's graduates, and by frequent conferences and visits of teachers and principals to inspect college work, the university proposes to keep informed of the general quality of its accredited schools, and then to give them the greatest possible liberty in working out their own curricula to meet local needs. The requirements are general, not specific. Certain sequences of work must be carried out in order that the university may have a foundation upon which to build, the choice of these sequences must be from certain standard subjects, but within these limits the school is free, and the university is ready to supplement the preparation of its students wherever necessary by secondary courses in those subjects it considers essential to a university training.

The address of the retiring vice-president, A. Ross Hill, of the University of Missouri, emphasized anew the need for the development of the scientific spirit and the ability to solve real problems, rather than for the mere teaching of technical science. Prof. C. R. Mann, reporting on the work of a general course in physics at the University of Chicago, showed how this could be done. E. E. Slosson, associate editor of the *Independent*, called attention to the dearth of writers or lecturers able to deal with scientific subjects

in an interesting manner, and contrasted present conditions with those of the early days of science. He urged that courses in journalistic English be made an important part of scientific training.

Four papers were presented at the Friday morning session. Dr. J. E. W. Wallin reported an important investigation in Experimental Oral Orthogenics. A squad of 27 school children in Cleveland, Ohio, were given free dental treatment and hygienic instruction—filling of cavities, cleaning of gums, instruction in the care of teeth, ‘fletcherizing’ of food, etc.—and before, during, and from three to five months after this treatment were given a series of five mental tests to determine whether or not the remedy of physical defects had produced a corresponding increase in mental power. In spite of much individual variation, the results showed a decided gain in every test. The best proof of the benefit, and therefore of the importance of the work, is that, although all the members of the squad were laggards of from one to four years, only one failed of promotion in the term immediately following the treatment. The beneficial effects on the general health of the children was noticeable to children, parents, and teachers alike.

In the absence of M. B. Hillegas of Teachers’ College, Prof. Torn-dike, chairman of the section, presented very briefly some account of the preparation of a scale for the measurement of merit in English writing. He read certain units of the scale and answered questions as to the use of the scale in practical work.

Prof. Norton’s paper on “A Suggested Method of Experimentation in Education” was general in character, but it made very plain the fact that most educational problems are settled by custom, practical experience, opinion, etc., and that most of them are susceptible of strictly scientific treatment through control experiments within the school itself. On the other hand the purely scientific work done in the educational and psychological laboratories of the country is very rarely directly applied to actual school conditions. He urged, therefore, a closer co-operation between the scientific workers in educational psychology and the teachers and administrative officers of the school.

The last paper of the morning, quite by chance, came as a good illustration of the main point of the preceding paper, as it represented the scientific study of a real school problem by a worker directly concerned in its solution. S. A. Courtis, of the Detroit

Home and Day School, gave a short report of the conclusions reached in an investigation to determine Standard Scores in Arithmetic. The results from the measurement of 9000 children in many schools revealed a condition of such great variability in all grades and schools examined that each grade, with respect to any single ability, was four or five grades wide. This result was shown to be remarkably constant, and to be independent of any errors in the method of securing the data. A comparative study of individual records disclosed great individual specialization, while the measurement of whole families at one time seemed to prove that the effect was due to inherited peculiarities of the individual mind. Mr. Courtis emphasized the variability of the individual as the most important factor in determining school procedure, and showed how, by supplementing class work by assignments of special work based upon the measured needs of the individual, it was possible to secure for each individual standard growth and standard scores at each grade.

Seven papers were presented at the joint session Friday afternoon, only three of which, from lack of space, can be reported in any detail here. Prof. Howard C. Warren, of Princeton University, described Montessori's Method of Teaching Writing and Reading. Interesting as was the paper, the criticisms of and comments on the method brought out many points usually passed over in such discussions, particularly the time cost of the method, and the possible effects on the health of the children in after life of such long hours of mental effort in early childhood. On the other hand, several who had visited the schools bore witness to the excellent results obtained and the apparent health and contentment of the children. The rapid and faddish introduction of the system into American schools was also commented upon unfavorably.

An interesting paper by Helen Thompson Woolley, of Cincinnati, described an attempted "Application of Experimental Psychology to the Problem of Vocational Guidance." The new child labor law of July, 1910, requires that working papers be issued only to children who are at least 14 years of age and have completed the 5th grade; and further that such children must report at the certificate office at each change of position. A special research bureau, working in co-operation with the Board of Education is attempting to make a careful study of individual children who go to work. The study includes the educational history, physical and psychological

measurements, home conditions, industrial history, and factory schedules of each child, and the measurements are repeated at each return to the certificate office. Standard psychological tests of mental traits are used under carefully standardized conditions. The accumulation of such data will in time show very plainly whether there is any connection between natural aptitudes in the traits measured and certain vocational pursuits.

Another paper of interest both to psychologists and educators was that by Dr. Starch of the University of Wisconsin, describing "An Objective Measure of Handwriting." By means of a graphometer consisting of a square of celluloid ruled in lines showing each degree of slant, and in horizontal lines above and below the base line, the mean variation in the slant of the first ten tall letters of any sample, and the mean variation of the letters above and below a base line, can readily be determined. From these two measurements a co-efficient of variability is derived, which, by reference to a fixed series of values, gives at once the quality of the handwriting so measured. Thorndike's scales, tested on this basis, yielded a series of values differing from each other under a constant law, and revealing the wonderful exactness of the units of the scale. It is to be hoped that Dr. Starch's work will be supplemented and confirmed by other investigators.

The remainder of the program* was devoted to investigations of learning and memory. Dr. Lough, of New York University, reported that the experimental study of the learning curves of many persons in the substitution test failed to show any characteristic "plateaus." Of the papers on memory, special interest attached to the report of Prof. Henmon, of the University of Wisconsin, that Ebbinghaus' well-known "law" as to the relation between amount to be learned and retention could not be confirmed. Henmon's results are in line with the recent work on economical learning and suggest strongly the need of retesting others of Ebbinghaus' classic conclusions, particularly since Ebbinghaus himself cautioned against generalization from results obtained on himself alone.

Detroit, Mich.

S. A. COURTIS.

*The paper by L. W. Cole, on relative time and accuracy of adding upward and downward, which was read by title at this session, appears on page 83 of this issue. The paper by L. W. Kline, on the psychology of spelling, also read by title, and the papers by Professor Warren and by Dr. Starch will appear in forthcoming issues of the JOURNAL.—*Editors.*

ABSTRACTS AND REVIEWS.

RECENT LITERATURE ON THE BINET TESTS.¹

1. ALFRED BINET ET TH. SIMON. *Le développement de l'intelligence chez les enfants*. Année Psychologique 14: 1908. 1-94.
2. O. DECROLY ET (M^{LE}.) J. DEGAND. *La mesure de l'intelligence chez des enfants normaux d'après les tests de MM. Binet et Simon*. Archives de Psychologie, 9: No. 34, Jan. 1910. 81-108.
3. ALFRED BINET. *Nouvelles recherches sur la mesure du niveau intellectuel chez les enfants d'école*. Année Psychologique, 17: 1911. 145-201.
4. ALFRED BINET ET TH. SIMON. *La Mesure du développement de l'intelligence chez les jeunes enfants*. Bulletin de la Société Libre pour l'Etude Psychologique de l'Enfant, Nos. 70 and 71, April, 1911, (11th year, No. 5.) 187-248.
5. HENRY HERBERT GODDARD. *Two Thousand Children Measured by the Binet Measuring Scale of Intelligence*. Pedagogical Seminary, 18: June, 1911. 232-259.
6. OTTO BOBERTAG. *Ueber Intelligenzprüfungen (nach der Methode von Binet und Simon.)* Zeitschrift für angewandte Psychologie, 5: No. 2, 1911. 105-203.
7. KATHARINE L. JOHNSTON. *M. Binet's Method for the Measurement of Intelligence.—Some Results*. The Journal of Experimental Pedagogy and Training College Record, 1: No. 1, March 1, 1911: 24-31.
8. ALICE DESCOEUDRES. *Les tests de Binet et Simon et leur valeur scolaire*. Archives de Psychologie, 11: No. 44, Nov., 1911. 331-350.
9. ISABEL LAWRENCE. *A Study of the Binet Definition Tests*. Psychological Clinic, 5: No. 7, Dec. 15, 1911. 207-216.

¹For the sake of completeness, mention may also be made of an article by A. LEBONUTTI in the Rivista Pedagogica, 3: No. 3, 1909, and a monograph by TREVES E SAFFIOTTI, *La scala metrica dell' intelligenza*. Milano, 1911. These the writer has not been able to examine.

10. LEONARD P. AYRES. *The Binet-Simon Measuring Scale for Intelligence: Some Criticisms and Suggestions*. Psychological Clinic, 5: No. 6, Nov. 15, 1911. 187-196.
11. LEWIS M. Terman. *The Binet-Simon Scale for Measuring Intelligence: Impressions Gained by its Application on Four Hundred Non-selected Children*. Psychological Clinic, 5: No. 7, Dec. 15, 1911. 199-206.
12. J. E. WALLACE WALLIN. *A Practical Guide for the Administration of the Binet-Simon Scale for Measuring Intelligence*. Psychological Clinic, 5: No. 7, Dec. 15, 1911. 217-238.
13. EDMUND BURKE HUEY. *Backward and Feeble-Minded Children. Clinical Studies in the Psychology of Defectives, with a Syllabus for the Clinical Examination and Testing of Children*. Baltimore: Warwick & York, 1912. Pp. 189-202.

Perhaps no device pertaining to education has ever risen to such sudden prominence in public interest throughout the world as the Binet-Simon measuring scale of intelligence. Yet the scale itself was far from a sudden flash of genius in Binet's mind. Rather, as Professor Stern has recently said, it represents the culmination of a life work. As early as 1895 Binet had devised a series of tests which he offered as a tentative measure of "personality," and many of his publications during the succeeding decade give evidence of the continued search for an index of intelligence. In 1905 a practical demand, the determination of sub-normal pupils in French schools, led to the publication, in collaboration with Th. Simon, of a series of 30 tests of progressively increasing difficulty, which should serve as an aid in ascertaining the intelligence of children. It was not until 1908, however, after these tests had been tried on 203 Parisian school children, that the authors hit upon their great idea—the idea which is now attracting so much attention—that of arranging the tests in a scale, each step of which should correspond to the normal intelligence of a given age between three and 13 years (1). In forming this scale some of the earlier tests were discarded and new ones were added so that the total was 56, with from three to eight tests for each age. It is upon this 1908 series that most of the recent investigations and discussions are based.

Among the first to make use of the scale were Decroly and Degand (2), who employed it in a private school in Brussels with 45 normal

children ranging from two years seven months to 12 years eight months. While they professed satisfaction with the general scheme, they criticised individual tests—some as too difficult or too easy for the age to which they were assigned, others as too mechanical, others as tests of specific training rather than of general intelligence.²

As a result of these and other criticisms and of further study and use of the scale, the authors published a revised edition of it (3 and 4) in 1911, in which the number of tests for each age was reduced to five (except for the fourth year), many of the objectionable ones were dropped, a few new ones were added, and the whole scale was rearranged to make it more representative of the performance of normal children. An important part of this rearrangement consisted in assigning many of the tests for older children to more advanced ages, so that whereas the 1908 scale gave tests for ages XI, XII, and XIII, the 1911 scale made provision for XII, XV, and adults. Since the 1911 revision was intended to supersede all other forms of the scale, it may be considered the definitive pronouncement of the authors upon the subject, and is here presented in tabular form, translated from the *Bulletin* (4). To render the table more serviceable, the position of each test in the 1908 series is indicated, and its age-rank is given according to the findings of the six most important applications of the tests to normal children.

In order to reduce the data of these investigations to a common basis, a test was considered as properly ranked for a given age when 75% of the children of that age were able to pass it.

In their earlier article (1) Binet and Simon gave no detailed account of the application of each individual test, and it was therefore impossible to determine what justification there was for the assignment of a test to a given age. Indeed, the lack of definite data in this article is so striking that one is led to wonder whether the scale was not first worked out in the study and later tested on children of various ages as opportunity permitted. In the subsequent paper (3), however, Binet gives a detailed table of his results—a table which he admits is compiled from both new and old material—and on the basis of this the ranking in column one has been determined. In the same article Binet recounts the results obtained by Levistre and Morlé with 20 children of each age from VII to

²For a detailed account of Decroly and Degand's criticisms, see Whipple's *Manual of Mental and Physical Tests*, Baltimore: 1910. Pp. 514-516.

		1. Binet.	2. Levisire and Morlé.	3. Johnston.	4. Goddard.	5. Bobertag.	6. Terman and Childs.
BINET TESTS. 1911 SERIES.							
1908.	III.						
Same.	1. Pointing to eyes, nose, mouth, etc.						
	2. Memory for two digits.....						
	3. Description of a picture (enumeration)						
	4. Knowledge of family name.....						
	5. Memory for sentences of six syllables						
Same.	IV.						
	1. Knowledge of own sex.....						III
	2. Naming familiar objects.....						III
	3. Memory for three digits.....						III
	4. Comparison of length of two lines						III
	V.						
V	1. Comparison of two weights.....				V	IV	III
V	2. Copying a square.....				VI	V	IV
New	3. Memory for sentences of ten syllables					V	
V	4. Counting four pennies.....				V	IV	IV
V	5. The divided rectangle.....				VI	VII	IV
	VI.						
VI	1. Knowing morning and afternoon.	VII	VI		VI	VIII	V
VI	2. Definition of objects by use.....	VI	VI		VI	VI	IV
VII	3. Copying a diamond.....	VII	VII	VI	VII	VIII	VII
VII	4. Counting 13 pennies.....	VII	VII	VII	VI	VI	VII
VI	5. Elementary esthetic judgment..	VII	VII		VI	VI	VII
	VII.						
VI	1. Indicating right hand, left ear...	VII	VII		VI	VII	VI
VII	2. Description of a picture (indicating relations).....	VII	VII	VII	VII		IX
VI	3. Execution of a triple order.....	VII	VII		VI	V	IV
New	4. Indicating the amount of three 2-cent and three 1-cent stamps ^a .	VIII	VIII	VI			
VIII	5. Naming four colors.....	VIII	VIII	VI	VII	VIII	VI
	VIII.						
VIII	1. Comparing two objects from memory	VII	VIII	VI	VII	VIII	IX
VIII	2. Counting backwards from 20....	VIII	VIII	IX	VIII	VIII	IX
VII	3. Unfinished pictures	VIII	VIII	VIII	VII	VII	VIII
IX	4. Knowing the date.....	VII	VIII	X	IX	X	IX
VII	5. Memory for five digits.....	IX	IX	VIII	VII	VII	IX

BINET TESTS, 1911 SERIES (Cont.).

		1. Binet.	2. Levisire and Morlé.	3. Johnston.	4. Goddard.	5. Bobertag.	6. Terman and Childs.
1908.	IX.						
IX	1. Making change (four cents from twenty)*	IX	IX	X	X	IX	XIII
IX	2. Definitions of familiar objects (superior to use)	XII	X	X	X		XIII
X	3. Naming nine pieces of money...	IX	IX	XI	X	X	X
X	4. Reciting months of the year....	IX	IX	IX	IX	X	IX
New	5. Replies to easy problem questions	IX	IX	X		IX	
	X.						
IX	1. Arrangement of five weights....	XII	XII	X	IX	X	XI
New	2. Copying two designs from memory		XII				
XI	3. Detecting absurd statements....	XIII	XII	XIII	XI	XII	XII
X	4. Replies to difficult problem questions	XII	XII	XII	X	XII	XII
XI	5. Using three given words in two sentences	XII	XII		XI	X	XI
	XII.						
New	1. Resistance to suggestion						
XI	2. Using three given words in one sentence	XII	XII	XIII	XI	XIII	XI
XI	3. Naming more than 60 words in three minutes	XIII	XV	XII	X	XIII	XV
XI	4. Definition of abstract terms....	XV	XV	XIV	XII	XII	XIV
XI	5. Arranging words in a sentence..	XIII	XII	XIII	XI	XII	XIV
	XV.						
XII	1. Memory for seven digits.....	XV			XII	Ad.	XIV
XII	2. Rhymes	XIV			X	XV	XIV
XII	3. Memory for sentences of 26 syllables	XV			XV	XI	XV
New	4. Interpretation of a picture.....	XV					
XII	5. Problem questions	XV			XI		XIV
	Adults.						
XIII	1. Drawing design from a cut in quarto-folded paper						Over
XIII	2. Juxtaposed triangles				XIII		XV
XIII	3. Distinctions between abstract terms				XIII		XV
New	4. Difference between king and president						
New	5. Substance of a prose passage....						

*The French requirement is to count nine sous, three of which are double. Children are apt to be more familiar with coins than with postage stamps.

*The French have a single coin, the franc, for twenty sous.

XII (ranked in column two), and Miss Johnston's tests of varying numbers of Sheffield children, likewise from VII to XII years of age (column three). It should be noted that Binet's table gives the number of those who passed and of those who failed for each question at each age, that Levistre and Morlé record the number passing the test for every ten pupils examined, and that Miss Johnston merely indicates the total number of pupils of each age, and the number of those who fail on each question. The method of computing the rank of the test is therefore slightly different in each case. On the whole it would seem to the careful reader of this article that the statistical basis for the arrangement of the individual tests was not altogether convincing, and that furthermore the authors were not always guided in this arrangement by the statistics at their disposal.

The article in the *Bulletin* (4) presents the revised scale, gives detailed instructions for the conduct of each test, and indicates in very general terms the manner in which children of various ages respond to the tests. It is intended as a practical handbook for the administration of the tests, and is unquestionably the most authoritative guide for their use. There is no discussion of the merits of any test, as their validity in the present form is taken for granted.

The most extensive practical trial of the tests on school children has been made by Dr. Goddard (5), who superintended the examination of 1547 pupils in the Vineland, N. J., schools. Dr. Goddard is enthusiastic over the scale as an instrument for detecting mentally retarded children, and for revealing the extent of the retardation. Since the pupils show an almost normal curve of distribution about the "at age" group, he argues that the tests must be carefully and accurately graded age for age. To show the validity of the scale he has tabulated the responses of all pupils grading "at age," giving the number of those who passed and those who failed on each question. From this table the ranking in column four has been computed. It is unfortunate that with this mass of valuable material in hand no table is given to show the responses of all the pupils examined to each question. While it may seem fairer to the scale to judge of the arrangement of the questions by the reactions of those pupils grading "at age," it must be borne in mind that they number only 554, and thus constitute but a little over one-third of the 1547 children tested. In an inquiry as to the validity of the scale, however,

one must ask what percentage of children of a given age *taken at random* are able to answer each question satisfactorily, and this demand would be more nearly met by tabulating all the results than by taking only those from a selected group.

Dr. Bobertag (6) gives the most thorough psychological analysis of the individual tests that has yet been made. He examined over 800 children in the Breslau schools, and while he presents no formal tables, he indicates in the discussion of each question the percentage of pupils of a given age that gave satisfactory answers. From these statistical notes the rankings in column five were determined. The rankings in column six were estimated from the table of Terman and Childs on page 72 of this issue.

An inspection of the table shows that in spite of many differences in the rankings of individual questions there is a surprising agreement in the results of the different investigators. This is the more striking in view of the widely separated communities in which the tests were made. France, England, Germany, New Jersey and California are widely enough distributed to be fairly representative of the civilized world. From this agreement we may draw two conclusions: First, that a large number of the tests are correctly placed; second, that the following tests should be shifted: VI, 3, 4 and 5 to VII; VII, 3 to VI; VII, 5 to VIII; VIII, 4 to IX; IX, 1 and 2 to X; X, 3, 4 and 5 to XI or XII; XII, 2, 3 and 4 to XIII or XIV. It is noteworthy that many of these shifts would return the tests to the same places they held in the 1908 series. Whether the fact that these results were obtained with the use of the 1908 scale has any bearing on the ranking of the tests, only the use of the 1911 scale under the same conditions could determine. We are informed that Dr. Goddard is at present conducting such a check examination in Vineland.

A large part of Dr. Goddard's paper (5) is devoted to a detailed comparison of the mental age of pupils, as determined by the Binet scale, with their grade in school, or their pedagogical age. He finds that only about half of the mentally "over age" and "under age" pupils show a corresponding advancement or retardation in their grading. Half of them are therefore said to be improperly graded. From his general experience the writer suspects that this is probably the case, yet it does not seem to follow from a consideration of the Binet tests alone. A pupil's grade in school should depend on his

mastery of school subjects. The Binet tests are supposed to be tests of *native intelligence*, and to neglect as far as possible all that has been learned in school. Hence it might well happen that a natively bright child should properly be retarded in his school standing, and a natively dull child by persistent application might well be pedagogically advanced. It is quite beyond the mark to carry these tests directly over to school work and make them a basis or a criterion of school grading. For this we need other tests worked out from the pedagogical point of view on the basis of school subjects.

In the most recent general study of the Binet tests (8) Miss Descoeudres selected one bright and one dull boy, and one bright and one dull girl from each of the six primary grades of the Geneva schools—making 24 pupils in all. Each of these was tested with all the questions of the 1908 scale. The results are not tabulated nor are they arranged in convenient form for tabulation. The author finds the scale too easy at the bottom and too hard at the top (as does Terman in the present issue). The bright pupils do better than the dull ones (57% to 43%), and the boys make a slightly better showing than the girls (53% to 47%). On the whole there seems to be some correlation between the teachers' estimates of "bright" and "dull" and the degree of intelligence indicated by the Binet tests.

Miss Johnston (7) recently tested 218 girls ranging from six to 15 years of age. She also finds the tests for VI and VII too easy, while those for X to XV are too difficult. Tests that gave particular difficulty were IX, 1, 2 and 3; X, 1, 4 and 5; and all of those in XII. It is impossible to obtain from her account any clear picture of the rank which should be given to individual tests.

Dr. Bobertag (6) has examined each question of the 1908 series in detail from a psychological point of view, showing the kind of mental activity involved in the test, giving minute directions to ensure clearness and accuracy of response from the child, rejecting some of the tests as having little value for intelligence, commending and amplifying others. X, 1, the arrangement of five weights, he considers an excellent test because it does not depend in the least upon learning, nor does it involve a verbal response. VII, 2, description of a picture, is a good test if the picture is properly selected. The definition tests, VI, 2, and IX, 2, he finds among the most interesting of the list, and yet the most difficult to evaluate, for in

many cases it is doubtful whether a definition by use is not superior to any other definition that might be given.

The definition test VI, 2, together with VIII, 1, comparing objects from memory, XII, 4, definition of abstract terms, and adults, 3, distinctions between abstract terms, has been employed as a written school exercise by Miss Lawrence (9). She had 784 pupils tested at the same hour in the day. She, too, found that a large number of pupils tested above age in the lower grades, but that an almost equally large number were below age in the higher. She thus confirms the statements of Terman and Descouedres that the scale is too easy at the lower end and too difficult at the upper.

But these are not the only criticisms that are leveled at the scale. Dr. Ayres (10) complains that it tests ability to use words rather than to perform acts. This is true in a high degree, for 43 of the 54 tests are verbal. Yet is it doubtful whether this is a very serious drawback, for our ordinary judgments of intelligence are based largely on linguistic ability. Again, many of the tests depend upon recent environmental experience, such as those involving time and money, or upon the ability to read and write, which is a matter of schooling. Further, many of the tests involve the immediate memory of words and numbers, but almost all investigators of memory have found that there is no correlation between memory span and intelligence. Finally there are too many "Puzzle tests," and an unreasonable emphasis is laid on the definition of abstract terms. To this it may be replied that the ability to cope with new situations is one of the most important criteria of practical intelligence, and there is perhaps no better way of testing this than by judiciously selected puzzle tests. Furthermore, the chief mark of the superiority of human intelligence over that of animals is man's ability to use abstractions. Tests which would reveal this ability in its different stages would have a high value as indices of intelligence.

Professor Terman (11) points out the fact that the value of Binet's work lies chiefly in the demonstration of the feasibility of such scales and their utility for particular purposes. Heretofore tests of intelligence have been haphazard and without any central controlling principle. This principle Binet supplied by correlating intelligence with age. While the Binet scale is far too limited in extent, far from accurate, and requires improvement in many re-

spects, it deserves the credit of a pioneer work. The author emphasizes the necessity of connecting tests of intelligence with tests of physiological age.

Dr. Wallin (12) notes that the general use of the Binet tests will soon yield a mass of valuable data about children if it is collected uniformly. To this end he furnishes detailed and carefully worded directions for giving the 1908 tests, insisting that this series needs to be tried out more carefully before further revisions are attempted. The same purpose has animated Dr. Huey to insert in his book (13) a syllabus for the use of the 1911 Binet scale with certain modifications suggested by Goddard.

In all of these studies of the Binet-Simon measuring scale of intelligence the writer has been impressed by the fact that not a single investigator has raised the question "What is native intelligence? What does the term signify? What ground have we for thinking that these questions will reveal what we mean by intelligence?" That some of them refer to only a very limited sort of intelligence is fairly obvious. Their selection or rejection seems to have been largely a matter of caprice thus far. Is it not time to begin at the other end, to attempt an analysis of the complex, popular term intelligence, and on the basis of this analysis to devise tests which will correlate with chronological and physiological age? Such a task would be worthy of the best efforts of any experimentalist.

J. C. B.

HENRY H. GODDARD. *Four Hundred Feeble-Minded Children Classified by the Binet Method*. Pedagogical Seminary, 17: September, 1910, 387-397.

The application of the Binet-Simon tests to children in the Vineland, N. J., institution afforded a classification of the 400 individuals tested that was felt to be satisfactory and reliable, when checked in various ways by reference to the experience of the institution and to the opinions of those having the children in charge. The children ranged in mental age from one to twelve years.

One source of difficulty is of special interest. Suppose a feeble-minded person to achieve the mental development corresponding to the Binet-Simon ten-year grade, but suppose him actually to live to be 50 years old: what effect will the long experience have upon his performance? Speaking generally, such an individual will have learned to do a great many things more than any single ten-year-old

child does: his superior performance, then, will indicate longer experience, not greater intellectual maturity. Cases so extreme as the one just assumed must be thrown out of consideration in estimating the correspondence between the diagnosis of the tests and the diagnosis of the institutional force.

Speed of performance with the "form-board test" appears to correlate very well with the psychological age as indicated by the Binet-Simon tests.

Those shown by the mental tests to rate psychologically as one or two years may be classed as idiots, those rating three to seven years as imbeciles of low, middle, and high grade, those rating eight to twelve years as feeble-minded (in the narrow usage of the term)—the last two years being high grade feeble-minded, or *morons* (to use the term proposed here and now generally adopted).

The problem of the "moral imbecile" is raised by Dr. Goddard, who proposes the novel explanation that this type represents a nine-year old arrest of development—the idea being that lying, thieving, and the like are instinctive tendencies normally nascent at nine, and overcome thereafter in the ordinary child. Had the arrest come earlier, the imbecile would not have developed these instinctive tendencies: had it come later, he would have developed sufficient reasoning power to overcome them.

The reviewer is not disposed to dispute this hypothesis, though he would like to see further evidence before accepting it: he can not, however, see the force of Dr. Goddard's assertion that in primitive times, "lying and stealing were virtues and *consequently* became instinctive." This looks pretty much like the inheritance of acquired characteristics.

CORNELIUS HOOD.

Cornell University.

EDMUND B. HUEY, PH.D. *Retardation and the Mental Examination of Retarded Children.* (Reprint from *Journal of Psycho-Asthenics*, Vol. XV.)

The writer of this article sets forth a point of view which, though not novel, has had, in my opinion, far less attention than it deserves. He calls attention to the fact that the Binet-Simon diagnostic tests of mental development are essentially tests of intelligence; that they stop short at the pubertal period, and that we have as yet no satisfactory extension of the series into the highly important period of adolescence. He reminds us that feeble-mindedness, as encount-

ered in institutional cases, begins at about the 8th psychological year, but stops short at the dead-line of the 12-year intelligence (only two in an institution of 1300 reached the Binet 13-year level). Now, may we assert that any person who can pass the 13-year tests may be considered normal in intelligence? Perhaps, yes, if by "normal intelligence" we mean ability to "get on" outside a protective institution. But to get on as a laborer does not mean to get on as a physician or as an attorney. Every professional and social class has its dead-line of minimal ability, and in the activities of adult life individuals become sorted out into strata according to their capacities—capacities conditioned not merely by intelligence, but also by "normality of will, of self-assertion and self criticism, of social sense and attitude, and of emotional control. And here, in this rich, but precarious field of functionings are found the next higher rungs of the retardation ladder."

We need, then, according to Huey, adequate tests to detect the incapacity for making these higher adaptations of mental development, tests which would naturally apply to the period following the Binet-Simon scale, since adolescence is the period when these adaptations are or should be perfected.

Most of the chronic psychoses and neuroses classed as neurasthenia, psychasthenia, and hysteria are cases of retardation. "Retardations occur continuously on up the years of growth to maturity." And these "higher level retardations should especially concern us, since they cripple the individuals who have a part to play in society." Defectives above the 12-year level "are presenting the most serious of the problems of society."

The tests to be desired must deal with control of movement, attention, capacity for synthesis, emotivity, feeling, the play and art interests, learning, memory, and ability to report, reasoning, the formation of ideals, temperament, and especially the "self-estimations and self-relationships."

CORNELIUS HOOD.

Cornell University.

ALICE DESCOEUDRES. *Exploration de quelques tests d'intelligence chez des enfants anormaux et arriérés*. Archives de Psychologie, 11: November, 1911, 351-375.

The author, at the suggestion of Claparède, sought to determine by trial the merits of a set of 15 tests of intelligence, six taken from

the Binet-Simon series, and nine others. The plan was to select 14 backward and abnormal children of both sexes, and ranging from six to 14 years of age (chronologically), to determine by general observation of the daily work of these children their rank in intelligence and to compare, by correlational statistics, their rank in each of the 15 tests with this originally estimated rank.

The tests taken from the Binet series were (1) description of pictures, (2) definitions of familiar objects, (3) differences between familiar objects recalled in memory, (4) naming words for three minutes, (5) replies to four problem-questions, and (6) naming four coins. The tests added by the author were: (7) stringing 20 beads as rapidly as possible, (8) sorting into four boxes by touch alone five each of coffee beans, kidney beans, peas, and grains of wheat, (9) test of "imagination" (inventing a speech for children or animals shown in three pictures), (10) test of visual imagination (naming six incomplete drawings), (11) reconstructing simple puzzle pictures (a horse and a dog, each cut into six parts), (12) cancellation, (13) computation (six very elementary problems), (14-15) a group of five and one of nine objects is shown (or named) to be reproduced by drawing (attention and memory).

The results are striking. When the rank of each pupil in each test is summated, the resulting total rank shows a correlation with the originally estimated rank of intelligence, of $r=.991$, *p.c.* .001. When the tests are considered separately, the correlation ranges from $r=.878$ to $r=.509$. In order of height of correlation with estimated intelligence, the several tests assume the following order (using the numbers given above): 3, 13, 1, 5, 8, 2, 7, 9, 11, 6, 12, 14, 10, 15, 4. The first six of these (differences between objects, computation, description of pictures, problem-questions, sorting seeds, and definitions) correlate with estimated intelligence by .80 or more.

If these results, secured with a small number of backward children, can be confirmed by more extensive investigation with both backward and normal children, they will go far to establish the reliability of simple psychological tests in the diagnosis of degree of intelligence, and they will suggest a useful method of testing tests themselves in terms of their value as indicators of mental age.

Cornell University.

CORNELIUS HOOD.

GUY MONTROSE WHIPPLE. *Relative Efficiency of Phonetic Alphabets*. Educational Psychology Monographs. Baltimore: Warwick & York, Inc., 1911. Pp. vii, 52. Paper, 35 cents.

More and more the methods of experimental pedagogy are called upon to throw much needed light upon practical questions. The subtitle of this Monograph, "An Experimental Investigation of the Comparative Merits of the Webster Key Alphabet and the Proposed Key Alphabet Submitted to the National Education Association," indicates its scope. The most extravagant claims have been made by a small group of phonetic enthusiasts and educational reformers regarding the psychological and pedagogical advantages of the Proposed Key Alphabet. Professor Whipple has subjected some of these claims to the "acid test" of experiment, and has found them wanting. The questions raised were the following: Is the Proposed Key more easily or less easily learned than a key like that now in common use, the Webster Key? When once learned, is it remembered as well as the Webster Key? Can it be used as a guide to pronunciation with as great facility and accuracy as the Webster Key?

Four sets of experiments were undertaken: (1) On beginners in reading; (2) on fourth-grade pupils; (3) on seventh and eighth-grade pupils who had had no previous training in phonics or in the pronunciation system of any dictionary, and (4) on college students. The method of the experiments, the materials used and the results obtained are set forth in the Monograph with scrupulous regard for the details of scientific procedure. One group of pupils was taught the Proposed Key, another the ordinary key, and after the same number of learning lessons it was found that from 47.3 per cent. to 71.3 per cent. more errors were made with the Proposed Key. One week after learning had ceased 55.6 per cent. more errors were made with the Proposed Key. The learning of the Proposed Key by college students exacted 41 per cent. more repetitions, with 85 per cent. more errors, than the learning of the Webster Key. In conclusion, the author summarizes his results thus: "Careful experiments with children in the public schools and with college students show that, without exception, the Proposed Key is more difficult to learn, and that, when once learned, it is more slowly and less accurately used, whether we measure the facility of its use by tests of pronunciation of the isolated symbols, pronunciation of proper names, pronunciation of nonsense syllables, or by tests of phonetic transcription of simple words."

J. C. B.

NOTES AND NEWS.

The publication (as a number of the *Educational Psychology Monographs*) of Professor Whipple's tests of the Phonetic Key Alphabet **THE "KEY ALPHABET"** bet has brought forth a veritable little **AND ITS ADVOCATES.** storm of abuse and vituperation. It will be remembered that this Alphabet was proposed for the indorsement of the Department of Superintendence at the Mobile meeting with the distinct and emphatic assertion that it was *easier to learn, easier to remember, and easier to apply* than the system of diacritical markings now in common use. It is clear that these assumed virtues are distinctly and exclusively psychological in their nature; the committee which constructed the new alphabet was made up exclusively of philologists and school administrators. They put forth their joint production under an untested psychological assumption. Professor Whipple put the Alphabet to the test of actual practice under controlled conditions. His results did not substantiate the statements made by the committee.

Now comes President H. H. Seerley of the Iowa Teachers' College, a member of the committee, with a circular-letter to the members of the Department of Superintendence, citing the opinion of five philologists against the validity of Whipple's conclusions. One sentence in Mr. Seerley's letter may be taken as indicative of his position in the matter:

"This Key is a free key that anyone may use or anyone can reject, and there is no good reason why so much disturbance should be produced by those who do not care to use it."

With due respect to President Seerley, we maintain that, when an attempt is made to foist upon the public schools through the leading association of public-school workers a theory that rests *by the statement of its advocates* upon untested psychological assumptions, it is not only the right, *it is the duty*, of the educational psychologist to determine in how far the assumptions can be justified. If the Key had been proposed on the ground of its philological superiority, it

would not be the province of the specialist in educational psychology to pass judgment. But it was not urged from this point of view.

In the name of our profession and in the name of some twenty million school children innocent of both philology and psychology, we protest against the uninformed and undignified vituperation to which Professor Whipple has been subjected. He was clearly within his rights in making the investigation; his published conclusions were justified by his published data; his statements were good-tempered, impersonal and guarded. His tests may be repeated. His methods may be improved; his conclusions may be reversed; but the fact still remains that he was the first to subject the claims of the new Alphabet to the test of actual practice. He was the first to adopt a simple expedient to determine whether the Alphabet really "worked" upon a limited number of individuals before he should endorse it for universal adoption.

W. C. B.

We had thought that the teachings of Bacon, Darwin, Huxley and others of that brilliant group whose labors meant so much for science **SEEING IS** had colored indelibly the intellectual life of the present **BELIEVING.** day. In our simple faith we forgot for the moment that intellectual habits and attitudes often fail to "transfer." Rude is the awakening. Among the opinions cited by President Seerley in his circular-letter is the following from Professor C. H. Grandgent, chairman of the Romance Department, Harvard University:

"His [Whipple's] results are contrary to reason. One has only to look at the two alphabets to see which is the shorter, the simpler, the easier to write, and the better adapted to mnemonic processes."

Shades of Giordano Bruno! One has only to look at the sun to see that it wheels from east to west above a stationary earth! One has only to look about one to see that this world of ours is flat!

W. C. B.

The Secretary of the Simplified Spelling Board, contributing to President Seerley's symposium, makes an interesting suggestion: **SOME GRATUITOUS** "Another fact bearing upon the matter might **INSINUATIONS.** be brought out by inquiring whether Professor Whipple undertook this investigation of his own motion, or whether he was asked to undertake it, for a consideration. by some party in-

terested. It would also be highly interesting to know the name of that party. Perhaps a clue to the name might be found in the fact that the investigation was undertaken soon after the February meeting, and was ended in time for the July meeting, of the National Education Association. A further line of inquiry might be opened with the question why that party did not publish the report, but left it to be published by a concern in another city, bearing the romantic name of 'Warwick & York.' "

We fail to see the pertinence of either question. The propositions laid down by the committee in advocating the indorsement of the Alphabet by the Department of Superintendence made extravagant and untested assertions regarding the psychological merits of the Alphabet. Professor Whipple found that, in typical instances, these statements were not substantiated. If the advocates of the Alphabet are dissatisfied with the tests, it is their privilege to repeat them. Repeated tests will inevitably disclose any factors that might have operated to render Whipple's conclusions untrustworthy. Until such tests are made, the insinuations in the above citation constitute a purely gratuitous and entirely unjustified attack upon the integrity both of the investigator and of two reputable publishing houses. It is one thing to infer that investigations have been subsidized; it is another thing to make the double inference that the subsidy has colored the results. Until the latter has been proved, the former is of no significance. Truth is truth, whether it is paid for or not.

W. C. B.

And speaking of the way in which publishing houses are concerned in this matter, the following citation from a circular widely distributed by a publishing house that seems to be exploiting the new Key can hardly be omitted from the discussion :

THE KEY ALPHABET
AS THE TRIUMPH
OF THE CENTURY.

"The final completion and adoption of this Alphabet by the Department of Superintendence, it is believed, will pass into history as one of the greatest, if not *the* greatest, of the educational triumphs of the English-speaking world during the century."

When it is remembered that this circular was distributed some months *after* the results of Whipple's investigations had been made known at the meeting of the N. E. A. at San Francisco; and when it

is remembered that the circular neither referred to Whipple's conclusions nor reported factual evidence controverting them, this characterization of the new Key as one of the greatest educational triumphs of the century strikes us as about the most flamboyant bit of advertising that we have ever known educational publishers to indulge in. We suggest that the Secretary of the Simplified Spelling Board look carefully to his own backyard before he makes gratuitous references to the publishing house "bearing the romantic name of 'Warwick & York.'"

W. C. B.

In connection with the discussion of phonetic keys, the following statement by the well-known phonetician and educator, Professor **THE VIEW OF A** Alexis F. Lange, Head of the Department of **PHONETICIAN.** Education of the University of California, may be of interest to our readers. The statement was made to the writer for public use at the San Francisco meeting of the N. E. A.:

"As a student of phonetics and a teacher of English for over twenty years, I am opposed to the adoption of the report [on the Proposed Key] for the following chief reasons:

"1. The proposed phonetic key is not sufficiently scientific to serve the pupil, either now or later on, for scholarly purposes.

"2. It is not simple enough, nor pedagogical enough, to really assist the pupil in learning English.

"3. I seriously doubt whether any system will be satisfactory for purely educational purposes that goes outside of English letters and their traditional values in order to designate English sounds.

"4. I seriously question the propriety of committing the N. E. A. to a plan of which only experts are able to judge adequately."

J. C. B.

We have endeavored to keep our readers in touch with the development of the Binet-Simon scale for diagnosing mental age, and **THE AMATEUR AND THE** pose to publish several critical **BINET-SIMON TESTS.** appraisements of the scale during the next few months. It may not be out of place, however, to comment here upon the popularizing of the method and upon some of the consequences that may flow therefrom.

The Binet scale, after several years of trial by its originators and by various educational psychologists, is now evidently approaching a period of extensive use in the public schools. We understand, for instance, that New Jersey has enacted a law which directs a mental examination to be made of all school children who are pedagogically retarded. It is fair to assume that the Binet scale will be used: but who will conduct the examinations? Our large city school systems, with a few conspicuous exceptions, have not yet realized the imperative need of establishing psychological clinics or bureaus of child study, or even of employing a consulting psychologist. When psychological examinations come to be introduced, they tend, failing a psychologist, to fall into the hands of medical inspectors, which is bad enough, or to be assigned outright to classroom teachers, which, perhaps, is still worse. We have no quarrel with the use of the scale in the public school: properly used, it is of direct and practical value; but improperly used, it will become a farce which can but bring discredit upon psychology and retard the movement for its application to educational practice.

There is nothing about the conduct of the Binet-Simon tests that is intrinsically difficult, yet there is a source of error inherent in the use of any psychological procedure, which, as experience shows, is surmountable only by drill in psychological experimentation. I refer to the difficulty of following directions. No one who has drilled students in the laboratory has failed to be struck with the impossibility of laying down fool-proof directions for the conduct by an amateur of a psychological test. The motto: "Don't monkey with the method" ought to be hung on the walls of every laboratory. To cite examples: a young examiner is reported to me who "invented" a new set of test-questions to supplant a portion of the original Binet series, then varied these questions from child to child, and finally wondered why the Binet method was so unreliable. Another substituted letters for digits in the memory-span test because he "liked it better that way."

We hope the Binet scale will succeed in the public school: if we may not hope for psychologists to apply it, may we not at least hope that the school authorities will send their examiners to some institution where they may receive instruction in general and educational psychology, and special drill in the handling of what is really an exceedingly delicate psychological instrument?

G. M. W.

The trend of psychological interest is nowhere better gauged in this country than at the annual meeting of the American Psychological Association. The meeting just held in Washington was characterized by a dominating interest in *applied* psychology. One joint session was held with Section L, Education. One session was devoted to psychology in medicine, and proved exceedingly stimulating and fruitful. Among the physicians who took part were Doctors Franz, Adolf Meyer, Southard, Morton Prince, Jelliffe, Hoch, Kober, and Allen Starr. This session proved a sort of professional love feast in which psychologists and physicians exchanged a very hearty "we need you." About one-half of the remainder of the program dealt with phases of applied psychology. This tendency was also voiced by the president's annual address, which surveyed the scope and significance of mental measurement as a foundation for the applied psychological sciences. There was not a single paper representing the philosophical attitude. The absence of members of the Philosophical Association was regrettable. It is to be hoped that the Philosophical Association may change its plan of meeting in isolation, for it is perfectly clear that the psychologists must meet where they may have joint sessions and come into contact with the educationists, the physiologists, the physicians, and other related bodies, but psychology will ever remain bound in close ties with philosophy. C. E. S.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

THE "HOUSE OF CHILDHOOD": A NEW PRIMARY SYSTEM.¹

HOWARD C. WARREN,
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I.

Within the past five years psychology has made two important contributions to education. One of these is a set of tests for measuring the mental growth of children and comparing mental with physical age. The other is a new system of primary education. The Binet-Simon tests have already been widely used in this country; but the *Casa dei Bambini*, a modification of the kindergarten devised by Maria Montessori, is as yet scarcely known in America.

The Case dei Bambini were first started by a Roman society which owns some 400 model tenements and apartment houses. Its buildings are constructed on approved sanitary lines, and every effort is made to better the condition of the tenants.

In 1906 this Association decided to start schools and playgrounds in its houses for children between three and seven years old, that is, below the public school limit. Dr. Maria Montessori was asked to develop a program. The choice was especially fortunate. Dr. Montessori, after taking her degree in medicine, was for some years connected with the Psychiatric Clinic at Rome, where she made a specialty of feeble-minded children. Basing her work on Séguin's system, with modifications of her own, she was unusually successful in training her pupils. It occurred to her then that some of her

¹Read before the New Jersey State Pediatric Society, October 28, 1911.

methods might with advantage be applied to normal children. She left the Clinic to make a special study of experimental psychology at the University of Rome, at the same time carrying out pedagogical investigations in the primary schools. It was then that she was asked to superintend the starting of the proposed Houses of Childhood.

Dr. Montessori brought to her new work an unusual combination of practical experience and theoretical knowledge. But over and above these she possessed good judgment and a sound scientific sense, which enabled her to develop an original and workable system of elementary education. Her method of instruction and its underlying principles are described in her volume on scientific education, an English translation of which is soon to appear.² After examining the schools in Rome last summer and studying the method as explained in Dr. Montessori's book, I am firmly convinced that the success of the system is due to its sound psychological basis. It deserves the careful attention of teachers and others interested in the psychology of childhood.

The first of these schools was started in January, 1907, in one of the poorer tenements. Since then a number of others have been added, one in a better-class apartment house. Each school belonging to the society serves the inmates of a single tenement or block, and the schoolroom is in the building itself. Each is in charge of one teacher, assisted by a single helper. There were about 50 children in the school we visited. Parents going to work in the morning leave their children in the schoolroom and get them again when they return at night. The system has already yielded remarkable results. Without

²MONTESSORI, M. *Il metodo della pedagogia scientifica applicato all'educazione infantile nelle case dei bambini*. Città di Castello: Tip. S. Lapi, 1909, pp. 283. The present paper is based largely on this work. Translation by Miss Anne E. George, under the title *Scientific Pedagogy*, New York: Frederick A. Stokes Co., 1912. Teachers should examine also Montessori's *Antropologia pedagogica* (Milan: Vallardi), which is of less interest to psychologists. See also, TOZIER, J. *An Educational Wonder-Worker. The Methods of Maria Montessori*, McClure's Magazine, May, 1911, 37: 1-19; *The Montessori Schools in Rome*, *ibid.*, December, 1911, 38: 123-137; and *The Montessori Apparatus*, *ibid.*, January, 1912, 38: 289-302. SMITH, THEODATE L. *Dr. Maria Montessori and Her Houses of Childhood*, Pedagogical Seminary, December, 1911.

drudgery or forcing, the children reach attainments quite unusual for their age."

What the psychologist first notices in examining Montessori's system is that it is founded on a true conception of the child's mental processes. Motor habits are developed from instinctive motor tendencies; knowledge and habits of thought are built up by association. A second point, of special interest to the sociologist, is the influence of the schools on the community. Especially in the poorer dwellings the lessons of politeness, self-control, and individual initiative react upon the parents, and count as an uplifting factor in the social life. The daily program is as follows:

From 9 to 10, lessons in deportment and self-help. The children are taught to dress and undress themselves; to wash themselves; to keep their clothes clean and neat; to greet one another and the teacher politely; to wipe their feet before entering the room; to move about the room without tramping or brushing against the furniture. They are questioned about their doings at home—how they greeted their parents, what they talked about, what they had for the evening meal, with incidental advice if anything injurious was eaten. This instruction lays the foundation for good manners and sound living.

From 10 to 11 is the hour for intellectual training, which will be examined in detail presently. There follows a half-hour of simple gymnastics designed to cultivate grace in movement, healthful poise of body, and ease in carrying objects or handing them to others. From 11.30 to 12 is set apart for luncheon, with a short period of prayer. From 12 to 1 the children play without supervision. After this for another hour the play is supervised, and games are taught them. If weather permits, this takes place in the open air. The period from 2 to 3 is devoted to manual training, drawing, molding. The final hour up to 4 is devoted to group gymnastics and singing. There are plants and domestic

²Since the schools have become firmly established Dr. Montessori has given up her direct supervision over them. She is a regular lecturer at the University of Rome with the title of "Professoressa," and is engaged in training teachers who expect to use her system. She still retains charge of one Casa dei Bambini independent of the building society.

animals in the play-yard, and these are visited, cared for, and observed. The aim of the school is practical training, every step of which is of real value for the future.

Teachers may ask whether this program is not beyond the capacity of children of these ages—whether interest can be sustained—whether the work element does not dominate too much over the play. This criticism seems plausible before visiting the school, but I was soon convinced that Montessori's methods are effective in maintaining interest without undue fatigue.

An important factor in securing the children's sympathetic co-operation is the system of discipline, which contains two novel features.

First, the children are subject to no drill. They sit on low chairs at small tables, which they often move to another position. They come and go at will. They are not compelled to perform tasks. If attention flags, the subject is changed. In this way they are taught only what they are eager to learn; at the same time the aim is to interest them in studies usually taught at a later age. During our visit the children spontaneously wrote sentences and drew pictures of animals, engines, aeroplanes, and all sorts of objects with chalk on their slates (excellent representations for the most part), and brought them up in rapid succession for our inspection. They were practicing and learning unconsciously. A large part of the work is done at the children's own initiative; they teach one another, and the teacher's function is often little more than supervisory.

Another striking feature in Montessori's theory of discipline is the absence of reward and punishment. There are no prizes. The children are not praised for any unusual attainment. The pleasure of accomplishment is deemed a sufficient reward. Nor on the other hand are they reprimanded or punished for their failures. If a child hesitates or fails, the teacher passes to something else without comment, on the theory that attempting to correct a mistake would fix the error in the child's mind by association. The plan serves to reassure the timid, and Montessori reports that bad temper and mischief usually yield to the treatment also. Sometimes,

of course, extreme measures are necessary. The naughty child is then treated as a moral defective, not as a sinner. He is not whipped nor given any mark of disgrace, but on the other hand he is not included in the exercises. He is regarded with pity and shown a certain amount of consideration like an invalid. In every case, we are told, the child so treated soon overcomes his mood and is eager to be "well" again.

A cardinal principle in the new method is the brevity of the instructions given. Montessori is thoroughly opposed to the plan of attracting a child's attention by telling a story and leading gradually up to the point at issue. She believes it merely distracts and confuses him. Her own system tends to the opposite extreme. In teaching the distinction between warm and cold (one of the earliest exercises), the teacher merely dips the child's finger in a basin of water, saying, "Warm," then in another, saying, "Cold." Possibly the instruction is repeated—the child's finger is placed again in each, with the words, "Warm," "Cold," "Warm," "Cold." Nothing is said to distract the child's attention from the one point to be learned. No unnecessary words are used.

II.

The program of intellectual teaching is of special interest to the psychologist and teacher. Writing and reading are the culmination of a long series of sensory and muscular training. Montessori believes that every one of the senses, but especially the sense of touch and the kinæsthetic sense, can be developed to a far higher degree than we realize. One of the first exercises is learning to recognize objects by touch alone. This is accomplished by blindfolding the child and having him touch certain objects, at the same time telling him what they are. A piece of sandpaper and a piece of glazed cardboard are placed in front of him, and as he touches each in turn he is told that it is "rough" or "smooth." Hard and soft, heavy and light, are distinguished in the same way. The lesson soon becomes a game in which the child is eager to guess the thing submitted. Then samples of dress goods

are given and he gradually learns to distinguish by mere touch between silk, velvet, satin, wool, cotton, and linen, and between different grades of texture in each. The sense of form is taught in the same way. Cubes, oblongs, and other solids are presented, and he learns to recognize them by touch and the muscle sense, and place them correctly in the form-board. The senses of taste and smell are similarly developed, but not to so great an extent, on account of their lesser value in life.

The perception of colors is trained as follows: 64 pieces of stuff of different colors and shades are placed before the child; three samples, strikingly different, are selected as standards. He is told to put each piece near the sample which it most resembles. In connection with the sense of hearing the class is given a lesson in silence. The children draw the curtains and make the room quite dark, then sit noiseless in their seats. After a moment the teacher whispers the name of some child, who at once gets up quietly and tiptoes out of the room; then another and another is called until about a dozen are standing in the hall; meanwhile everyone in the room remains as still as possible.

After the training of the senses has progressed somewhat the children are taught the *names* of the colors, forms, etc. At the same time they are trained in exactness of the motor functions, including distinct articulation.

Montessori insists that the aim of education, especially at the start, is to train a child's energies along natural lines—to improve the motor and perceptual powers already present, rather than start abruptly upon something new. These exercises bring about a refinement of the child's perception. Rough and smooth, heavy and light, warm and cold, red and blue, may be distinguished from the start. But by gradual steps the child is trained to notice finer and finer degrees of difference.

The teaching of writing falls into three distinct periods. First, practice in holding and wielding the pen; then exercises in associating the tactual-motor form of a letter with its name and visual form; finally, the combining of letters into syllables and words.

(1) In the preliminary training no letters are used. The first step is to practice filling in simple geometrical forms. One of the blocks from the form-board is given the child. He places it on his paper or slate and draws an outline around it. Then removing the block he fills in up to the outline with a colored pencil or chalk. This gives him practice in holding the pencil and controlling it. The child is soon able to fill in the figure without over-running the boundary. Next he learns to draw the outline free-hand.

(2) Then comes the second stage, the learning of letters. Montessori uses a set of letters cut out of sandpaper and pasted on smooth rectangular cards. The letters are script, 8 cm. in height. Capitals are not used till later. The most important part of this training consists in learning to associate the name of a letter with the *writing movement*, as well as with its visual appearance. The child looks at the sandpaper letter and at the same time runs his fingers over it, making just the movements he would use in writing; he is told that this movement is the letter *a, b*, etc.,. These exercises are continued as a game till the child has learned to recognize each letter by the movements required to reproduce it.

While these muscular exercises are proceeding the child is practicing the other associations which are needed. The teacher says, "Show me an *o*; show me an *n*." In this way the child learns to recognize the visual form of each letter and associate it with the name. Conversely, the teacher points to a letter and asks what it is. All these exercises serve to train the muscular memory, visual memory, and name memory of letters and establish associations between them. The child is now prepared for actual writing; but the purpose of the course is to teach him *words*, rather than letters, which convey no meaning.

(3) The third and final stage, then, consists in combining letters into syllables, words, and phrases. In the first place cardboard letters are placed in a row and the child is asked to repeat the sounds. *Ma* is first pronounced *m*, *a*, then as a single syllable, *ma*. This leads naturally to the converse problem. A word (e. g., hand, in Italian, *mano*) is spoken slowly and distinctly, "m-a-n-o," and the child finds the proper letters

in the box and places them in order. From this to the writing of words with chalk or pen is a simple step. The child who can build up words with cardboard letters soon finds it easier to trace them on slate or paper. He already knows the movements required to form them all.

Once the idea of writing is grasped, the children throw themselves into it with terrific zeal. They eagerly write down word after word, covering their slates and often the floor of the courtyard. And from this they pass quickly, and of their own accord, to the writing of sentences. On account of the careful preliminary training in the motor equivalents they form letters more accurately than the ordinary child, who is merely attempting to imitate a visual copy. The words which I actually saw written by children of 5 and 6 were far more regularly formed than those of most 10 or 12-year-olds taught in the ordinary way. Moreover, the act of writing really interests the child, and he is constantly practicing it and improving his chirography. Whereas copy-book writing is a task which a child usually tries to shirk; he never thinks of practicing it beyond school hours.

In the new system *reading follows writing* instead of preceding it. The children already know how to pronounce written words, but this is not "reading" according to Montessori. By *reading* she means the *reception* of ideas from visual symbols, whereas children at this stage merely repeat orally the ideas they have gained through graphic expression.

Learning to read detached words is a simple step: The teacher has a number of cards on each of which is a word in script. A child is asked to pronounce one of these. At first he gives it letter by letter, then he is told to repeat it faster, so as to make a word. The words selected are names of well-known things, and as soon as the child recognizes what he has pronounced he points to the object. The next step is to read phrases. The children soon read off sentences with considerable fluency; but they do not understand much of what they read. They are merely translating the visual symbols into spoken language without grasping the meaning.

The transition to actual reading formed quite a dramatic episode in the first instance. Montessori was writing phrases

on the blackboard, which the children read aloud in unison. At length she wrote, "Do you love me?" The children read the phrase aloud as usual, and she looked at them inquiringly. Suddenly they caught the idea and shouted, "Yes, yes!" She continued writing, "Well, then, keep silence and be ready." The children read this aloud: at once they became quiet and waited for the next step. Then she began a communication in writing, which the children read *in silence*, their attention now riveted upon the import of the sentences. Following her usual plan, the message involved *action*: "Close the shutters of all the windows and open the door; then wait a moment and arrange everything again as you found it." The children understood and obeyed the directions. Reading had acquired a new value. It was no longer merely a mechanical expression, but a means of acquiring ideas. The change came when they learned to check the impulse to read aloud. In place of the association between written symbols and speech came an association between written words and ideas. It was not necessary to begin with short words and easy phrases, for the training had made all words equally easy.

It need hardly be said that the parents were amazed at the result. The four-and-a-half-year-old son of an official who was being taught according to the Montessori system, astonished his father one morning by spontaneously reading the mail which lay open on the breakfast table.

The children at the Case dei Bambini are also initiated into the rudiments of arithmetic. They learn the simplest numbers without special instruction. Their attention is called to the fact that two buttons are missing on a dress or that three children sit together at a table. The meaning of numbers is taught more precisely by games with toy money in which they make change. This gives them considerable practice in counting.

The next step is to emphasize the number in place of the objects. The material for this is a series of sticks; the shortest is 1 dm. long, the next 2 dm., and so on up to 10. On each stick the dm. lengths are shown by alternation of colors. For example, the 3 dm. stick is red, blue, red; the 4 dm. red, blue, red, blue. Starting with the shortest stick, which is called

"1," the child places the next longer beside it with one end flush, the other end projecting. This stick is called "2." In the same way stick 3 is placed next to stick 2, and so on up to 10. At one end the edges are even, at the other each stick projects 1 dm. beyond the preceding. The children learn to associate the names 2, 3, 4, etc., with the proper number of extensions over the unit stick.

The next step is to associate written numerals with quantities. Montessori uses a board divided by raised cross-pieces into several compartments, each labeled with a numeral. The game consists in placing the right number of objects in the compartments—that is, as many in each compartment as the numeral it bears. Then they pass to a game in which the child is handed a folded slip of paper bearing a numeral, and is told to bring that number of objects to the teacher. At this stage the meaning of zero is taught. The pupil who receives the zero is often visibly perturbed at having nothing to do in the game.

The children are now ready for addition. The sticks are arranged in order from 1 to 10. The child takes the 1 stick and puts it end to end with the 9 stick, so that the two together are equal to the 10 stick. Thus he learns that "9 plus 1 equals 10." Next, the 2 stick is placed at the end of the 8 stick,—"8 plus 2 equals 10." When they come to the 5 stick they turn it along the middle end, saying, "2 times 5 equals 10." Subtraction is taught by reversing the process: "10 minus 4 equals 6," etc. All combinations of the first nine digits are taught.

In passing to numbers above 9, the chief difficulty is to make the children understand the decimal notation. Printed numbers from 0 to 9 are used. The child places the proper number opposite each stick from 1 to 9, and when he comes to 10 he is told to begin with 1 again, putting a zero after it to indicate its new position. 11 is indicated by substituting a 1 for the 0, and so on up to 20. They are taught to add, subtract, multiply and divide within these limits. By the time they leave the school most of the children can count up to 99. Finally, they are given the number 100, which always excites their interest.

III.

At the Case dei Bambini every effort is made to have the children work out their own education. Self-reliance, initiative, self-control, are fostered, and as a consequence the pupils have a poise and determination not often found at a much more advanced age. Apart from other results this in itself is well worth attaining. If there is any forcing it comes from within the child, not from without.

The program of studies and the methods of teaching at these schools challenge our system of secondary education as well. They indicate that the present curriculum needs thorough revision. It is founded on a faulty psychology; it does not consider sufficiently what a child is fitted to assimilate at any given stage of mental development. The younger a child, the less developed are his powers of thought and reasoning. On the other hand, young children are exceedingly quick in learning through temporal and spacial associations.

A child from 2 to 8 can learn four or five languages without effort; he can get such a grasp upon the construction of each that he retains the "feel" of its idioms all his life. If the learning of a language be delayed beyond the age of 15 most persons fail to catch its spirit. It never becomes second nature. Moreover, as one grows older the acquisition becomes more of a task.

In the case of logical disciplines just the opposite is true. If a child be started in arithmetic too young he wastes many precious hours in effort and makes little headway. I do not refer, of course, to learning addition and multiplication *tables*. This involves merely associative acts, and the earlier begun the better. But the application of these tables to practical problems is beyond the mental capacity of most young children. Whereas, if a child knows his tables by heart, at the age of 10, practical work in mathematics advances with comparatively little difficulty.

The psychologist would naturally conclude, then, that children should be taught languages and other memory disciplines at a very early age, and that mathematical and analytical studies should be reserved till later. I confess, however, that I was not prepared for the radical application of this principle

which Montessori has made. I should not have expected to find reading and writing within the capacity of the average child of 4 or 5 years old. And yet, when we examine the progressive development of studies at these schools, we see that these attainments are reached naturally and easily.

It would be interesting to apply the Binet-Simon tests to children taught at the Houses of Childhood. The Montessori system leads to unusual *attainments*. Does it produce unusual *functional growth* as well?

A TENTATIVE REVISION AND EXTENSION OF THE BINET-SIMON MEASURING SCALE OF INTELLIGENCE.

PART II. SUPPLEMENTARY TESTS. 1. GENERALIZATION TEST: INTERPRETATION OF FABLES.

LEWIS M. TERMAN AND H. G. CHILDS.
Leland Stanford University.

Experiments made by one of the writers with this test several years ago, led him to believe that the interpretation of a series of rightly selected fables would afford a valuable indication of intelligence. After a careful search 20 fables were chosen for preliminary trial in the hope that from them 10 or a dozen might be found offering progressive degrees of difficulty and hence lending themselves to serial arrangement in the form of a scale. Most of them were taken from Aesop, and will be recognized by the following titles:

- | | |
|---|---|
| 1. The Boy and the Filberts. | 12. The Jackdaw and the Doves. |
| 2. The Fox and the Crow. | 13. The Ants and the Grasshopper. |
| 3. Mercury and the Woodman. | 14. The Fish and the Pike. ¹ |
| 4. The Milkmaid and Her Pails. | 15. The Ape and the Carpenter. |
| 5. The Ass and His Shadow. | 16. The Hermit and the Bear. |
| 6. The Farmer and the Fox. | 17. The Fox and the Boar. |
| 7. The Stork and the Cranes. | 18. The Husbandman and His Sons. |
| 8. The Stag at the Pool. | 19. The Goatherd and the Wild Goats. |
| 9. The Eagle and the Tortoise. | 20. The Laborer and His Three Wishes. |
| 10. Hercules and the Wagoner. | |
| 11. The Father, His Sons and the
Rods. | |

These were given as a mass test to all the pupils of a school-room at one time. The regular period for a recitation in literature was employed. E distributed among the pupils blank sheets with numbered spaces in which the pupil's interpretations were to be written. Then taking his position in the front of the room E stated that he was going to read some fables, reminded the pupils that a fable is a little story which

¹For previous use of this test see Whipple's Manual of Tests, p. 454-457.

is meant to teach a lesson, and finally instructed them to write down after the reading of each fable the lesson which they thought it was meant to teach. After giving the test to about 40 pupils it became evident that the series was of very uneven value and that some of the fables too closely resembled others in the series. The list was accordingly shortened to eight, containing the following fables presented here in the exact form in which they were used.

FABLES.

I. THE MILKMAID AND HER PLANS.

A milkmaid was carrying her pail of milk on her head, and mused thus: "The money for this milk will buy 300 eggs. The eggs will produce at least 250 chickens. With the money which the chicks will bring I can buy a new gown. In this dress I will go to parties with the young fellows, who will all propose to me, but I will toss my head and refuse them everyone." At this moment she tossed her head in unison with her thoughts and dashed the pail of milk to the ground, and all her imaginary schemes perished in a moment.

II. MERCURY AND THE WOODMAN.

A woodman once dropped his axe into a deep pool and sat on a bank lamenting his loss. Mercury appeared, plunged into the pool and brought up a golden axe, and inquired if this were the one lost. When the man denied this, Mercury disappeared beneath the water a second time and brought up a silver axe. When the man said this was not his, Mercury dived a third time and brought up the right one. The man with joy claimed this, and Mercury was so pleased with the man that he gave him the gold and silver axes also.

III. HERCULES AND THE WAGONER.

A man was driving along a country road, when the wheels suddenly sank in a deep rut. He did nothing but look at the wagon and call loudly to Hercules to come and help him. Hercules came, and thus addressed him: "Put your shoulder to the wheel, my man, and goad on your oxen." He then went back and left the driver.

IV. THE BOY AND THE FILBERTS.

A boy put his hand into a pitcher of nuts and grasped as many as he could, but was unable to get his closed hand out of the neck of the pitcher. Unwilling to lose the nuts, he burst into tears, but still held on to the nuts.

V. THE EAGLE AND THE TORTOISE.

A tortoise complained to the birds that no one would teach her to fly. "I will teach you to fly, then," said the eagle, and he took her almost to the clouds, when suddenly he let her go, and she fell to earth and dashed her shell to pieces on the rocks.

VI. THE ANTS AND THE GRASSHOPPER.

A grasshopper which had sung merrily all summer was almost perishing with hunger in the winter. So she went to some ants that lived near, and asked them to lend her a little food which they had put by. "What did you do all summer?" they asked. "Why, all day long and all night long, too, I sang, if you please," answered the grasshopper. "Oh, you sang, did you?" said the ants, "Now, then, you can dance."

VII. THE FOX AND THE CROW.

A crow, having stolen a bit of meat, perched in a tree, and held it in her

beak. A fox, seeing her, wished to secure the meat, and thus addressed her: "How handsome you are! And I have heard that the beauty of your voice is equal to that of your form and feathers. Will you not sing for me that I may judge if this be true?" The crow was so pleased that she opened her mouth to sing, and dropped the meat, which the fox immediately ate.

VIII. THE STORK AND THE CRANES.

A farmer set some traps to catch cranes who were eating his seed. With them he caught a stork. The stork begged the farmer to spare his life, saying the farmer should have pity on his broken leg, that he was a bird of excellent character, and that he was not at all like the cranes.

The farmer laughed and said, "I caught you with these robbers, the cranes, and you must die with them."

To secure norms of performance for these eight fables they were presented in the above described manner to about 350 pupils from the fourth to the eighth grade, inclusive, in 14 rooms of the Palo Alto and Mayfield schools. The data obtained from these 350 cases may be considered thoroughly representative up to 13 years.

Scoring.—The difficulty of finding a method of scoring which does not give too large play to the personal equation is a serious criticism of the fables test. After experimenting with a number of methods the following system was adopted as the one best suited to bring out objective differences and to call attention to certain types of answers significant for clinical purposes:

(a) A completely generalized and entirely relevant reply—5 units.

(b) A generalization, quite plausible but slightly differing from the correct one, or else a correct statement mostly generalized but not perfectly free from the concrete—4 units.

(c) Correct idea stated in purely concrete terms—3 units.

(d) An irrelevant generalization—2 units.

(e) A reply in concrete terms with just a trace of relevancy—1 unit.

(f) No response, or an entirely irrelevant concrete statement—0.

The following samples of responses together with the scores assigned them will make this clearer.

Fable I. The Maid and the Eggs.

Score 0. "She wanted to be dressed nice and be praised."

Score 2. "Not to carry things on the head." "Not to be selfish." "Not to boast."

Score 3. "If the maid had not planned so far ahead she would not have dropped her milk." "Don't make schemes for the future while you are carrying milk."

Score 5. "Don't count your chickens before they are hatched." "Not to build air-castles." "Don't plan too far ahead."

Fable III. Hercules and the Wagoner.

Score 0. "Hercules was not kind." "Hercules was selfish."

Score 2. "Teaches politeness." "Teaches not to be mean." "To do as you are told."

Score 3. "The lazy man should get out and try to push the wagon out himself." "When you get stuck in the mud, don't call for help, but try to get out yourself."

Score 5. "God helps them who help themselves." "Teaches us to help ourselves before we ask others to help us." "Don't depend upon others."

Fable VII. The Fox and the Crow.

Score 0. "The fox wanted the piece of meat." "The crow ought not to have tried to sing till she had swallowed it."

Score 2. "Not to be stingy." "Not to steal." "Think before you act."

Score 3. "The crow was flattered by this speech." "The crow was too proud of her voice." "If the crow had not been so flattered she would not have lost her meat."

Score 5. "Do not let people flatter you." "Don't listen to praise."

Fable VIII. The Farmer and the Stork.

Score 0. "The farmer ought to have let the stork go." "The farmer was a bad-tempered man."

Score 2. "To be merciful." "Do not kill animals." "Don't blame the other fellow." "Never go into traps." "Not to tell lies." "Take what you get without squealing."

Score 3. "The stork should not be caught with bad people like cranes." "The stork was caught in bad company and had to be treated the same."

Score 5. "Keep out of bad company." "You are judged by the company you keep."

Scoring is made somewhat easier if we do not try to distinguished quite so many grades. It would be convenient, and not unreasonable, to combine the two groups here scored 0 and 1, and also the two groups scored 4 and 5. This leaves four types of interpretation, which usually are not hard to identify: The irrelevant (or almost irrelevant) concrete answer, the incorrect generalization, the relevant concrete

statement (*i.e.*, statement of the main point in non-generalized terms), and the perfectly relevant (or at least very plausible) generalization. These could be scored 1, 2, 3 and 4, respectively, or 0, 1, 2, and 3, or 0, 2, 3, and 5. Until we know more about the significance of these different types of answers and their relative frequency at different ages we can not be certain as to the best quantitative expression for them. Reverting to the method of scoring fables employed in this study, it may be said that the six-grade scale is not as difficult as it looks, and in actual use, after a little experience on the part of the scorer, constitutes but a slight modification of the four-grade scale. This is seen in the tendency which develops with practice, to keep in mind the above described four chief types of performance and to make sparing use of scores 1 and 4, reserving 1 for a few replies which should be spared from score 0, and 4 for a few which, though pertinent and generalized, are not quite what is wanted. Elegance, grammatical correctness, spelling, etc., should have no weight in the scoring. On the other hand it is necessary to be discriminating as to essential thought in the response. The tendency of the inexperienced scorer is to give too much credit. For example, the response "teaches to be industrious" (Fable III) hardly deserves a perfect score since the idea involved is that of self help, a slightly different thing. Similarly with the response "teaches not to depend on others" (Fable VII), a reply which is fairly plausible and partly justified by the facts, yet does not express the essential point, which is that we should "lay up for a rainy day," "look out for tomorrow," etc.

More serious is the question of the quantitative values which should be assigned to the types, based as they are on qualitative differences. For illustration, opinion may differ as to whether the type of reply given under (d) should be scored above or below that given under (c). Which is the better performance; to generalize the fable situation incorrectly, or to see the main point of the concrete situation involved without generalizing its meaning? Judging from the distribution of scores as shown in Fable V the latter seems to be a better indication of normal intelligence. Though believing that the above method of scoring fables is the most serviceable that

has thus far been devised, we are ready to discard it when a better is suggested.

As to the personal equation in scoring, only a comparison of the scores given by several persons to the same performances will determine its range and therefore the reliability of grades assigned by one individual. This the writers hope to do later. Our experience in scoring fables convinces us, however, that any study of individual differences of judgment in assigning marks must take great precaution to secure scorers who thoroughly understand the system employed and have had some training in its use. As far as our experience goes we do not believe that competent scorers will often differ more than 5 units (or $12\frac{1}{2}\%$) in grading by this method a set of eight well chosen fables.

Much depends on the choice of fables. Some are objectionable because they tend to provoke equivocal answers, others because they permit several plausible interpretations. A desirable fable is further characterized by the following points: (a) It should give with increasing years a rapidly decreasing number of the scores of 0 and 1. (b) Scores 4 or 5, or 4 and 5 taken together, should steadily increase. (c) Score 3 should probably not be very frequent in the upper years. (d) The per cent. of incorrect generalizations, that is the ratio expressed by the number of 2's divided by the total number of 2's and 4's and 5's added together, should gradually decrease. By reference to Table V it will be seen that Fables I, III, and VIII meet fairly well all these requirements. Fable II is decidedly objectionable as regards (a) and (d), and not above suspicion on point (b). Fables IV and V are objectionable as to (d) and (a), while Fable V also fails in requirement (c). Fable VI is excellent except for a rather large number of 1's in the upper years. This sort of analysis has led to the inclusion of Fables I, III, VII and VIII for use in the revised and enlarged measuring scale.

By allowing 5 credits for each unit in the score an S's performance may be conveniently stated in per cent. On the basis of four fables, an S who scores 20 points earns 100%, the score 13 points means 65%, etc. For most purposes it is perhaps sufficient to judge an S's performance by his total score, however expressed, although in clinical diagnosis it will be found

very suggestive to note what individual scores have entered into the total. For illustration, 40% earned by scoring 2 (or 10%) on each fable does not indicate the same mentality as 40% earned by scoring 3 (or 15%) on each of two fables, and 1 (or 5%) on each of the other two. The former indicates a decided tendency to generalize incorrectly, probably a sign of rather mature stupidity. The second 40% indicates a tendency to think in terms of the concrete, possibly a sign of immaturity rather than stupidity. Only extended use of the fables, however, with all grades of normal, retarded and advanced S's will determine the exact significance of these and other types of performance. For purposes of a scale the total per cent. earned may provisionally be taken as the most significant.

Results.—Table V shows the distribution of the various scores for pupils of each age and for the four fables selected for use in the revised scale. Table VI summarizes the data for the different years.

TABLE V.										
		Num- ber.	Scores.						Total of 4 and 5.	Percentage of Generalizations Incorrect. ²
Age.	0		1	2	3	4	5			
FABLE I. The Maid and the Eggs.	9	41	14	31	24	4	4	19	23	51
	10	53	13	22	20	4	9	30	39	34
	11	61	8	6	31	10	16	28	44	41
	12	80	7	10	22	5	16	39	55	28
	13	73	5	4	18	8	15	47	62	22
	14	43	5	9	20	5	16	38	54	27
FABLE II. The Wagoner and Hercules.	9	41	14	7	19	29	12	16	28	40
	10	53	9	9	13	19	17	32	39	25
	11	61	5	6	15	13	20	41	61	22
	12	80	3	12	12	11	21	39	60	17
	13	73	0	5	15	12	18	47	65	18
	14	43	5	0	9	2	36	45	81	10
FABLE III. The Fox and the Crow.	9	41	19	27	34	14	2	2	4	90
	10	53	17	26	35	2	5	13	18	66
	11	61	8	15	44	8	8	16	24	65
	12	80	11	17	32	6	15	17	32	50
	13	73	11	16	27	3	8	32	40	40
	14	43	14	7	34	5	14	25	39	46
FABLE IV. The Farmer and the Stork.	9	41	36	19	31	5	2	5	7	81
	10	53	21	24	24	2	4	24	28	46
	11	61	16	11	21	6	11	33	44	32
	12	80	15	15	22	5	7	33	40	35
	13	73	8	8	14	8	14	46	60	19
	14	43	7	5	18	5	11	52	63	22

²The per cent. of incorrect generalizations for a given age is obtained by dividing the number of scores 2 for that age by the combined number of scores 2, 4 and 5.

TABLE VI.

Year.	Number.	Median Score.	Score Reached by Two-thirds.
9	41	35-40	25-30
10	53	45	35-40
11	61	50-55	45-50
12	80	55	45-50
13	73	70	55-60
14	43	70-75	55-60

We believe the "generalization test" will prove a usable addition to the scale. It presents for interpretation situations which are closely paralleled in human social relations. It tests the power to unravel the motives underlying acts and attitudes, to look behind the deed for the idea that prompted it. It gives a clue to the status of the social consciousness. This, if correct, is tremendously important for the diagnosis of the upper range of mental defectiveness. The criterion of the subnormal's unfitness for life outside of an institution is his ability to understand and appreciate social relations and to adjust to them. Failure of a subnormal to meet this criterion may lead him to break common conventions, to misunderstand people and to be misunderstood, to be considered disrespectful, sulky, stubborn, deceitful, or in some other way queer and exceptional. He is himself misjudged because he misjudges others. The skein of human motives is too complex for his limited intelligence to untangle. Again, the rectitude of the moral life is directly dependent upon the accuracy of the social judgment. If the latter is rudimentary, true morality is impossible.

Recent ethnological studies, such as those of Sumner, Westermarck, and others, as well as many investigations in child psychology, give added proof of the social origin of the moral judgment. It would be interesting to know what proportion of juvenile offenders have transgressed our codes because of continued failure to grasp the essential lessons presented by human situations, the comprehension of which is a necessary basis of truly moral action. The social relations of the home, school, street, etc., present for the intellectually normal an endless succession of moral situations. That is, these are moral situations if they are comprehended, rightly generalized. For those who do not comprehend them at all they have

no moral lesson. Into the same situations other children of somewhat higher mentality than the last named read a meaning perhaps, but often the wrong meaning. Their moral development runs askew because guided by an unreliable power of generalization. We are justified in suspecting the intelligence of the so-called "moral imbecile." The small child is always a moral imbecile for lack of any understanding of social relations. If he becomes a moral man it is because of years of daily, almost hourly, experience and training in picking the moral kernel out of life-situations. The more subnormal the child's intelligence the more insignificant his moral increment. What is meant is forcibly illustrated by such responses as the following, frequently found in our fables data:

Fable VII.

"Taught the crow to be wise and not to open her mouth when she had anything in it."

"The fox was slicker than the crow was."

"Not to be generous to people you don't know."

"Not to sing when you have anything in your mouth."

"To think before you sing." "Not to be forgetful."

"Where there's a will there's a way."

"To eat the meat and then sing." "How to be wise."

"Don't answer if your mouth is full."

"Look before you leap." "When you have a thing, hang on to it."
"She should not have opened her mouth."

"Teaches us to look for tricks." "To finish one thing before we do another."

The above responses were given by pupils from 13 to 17 years of age, all of whom were retarded in school from 2 to 4 years. Similar illustrations were afforded by all the fables. It is hardly necessary to dwell further on the importance of the field here suggested for the further study of one of the most important factors in moral development.

Other points of excellence in the generalization test deserve mention. It does not need to be unduly complicated by language difficulties, as is always the case to greater or less degree in tests of ability to interpret poetry. (See for example, Bonser's Reasoning Abilities of Children in the Fourth, Fifth and Sixth Grades, p. 8). Again, fables can certainly be

found of widely varying difficulty, although it must be admitted that our own quest for an extended series was not as successful as we had hoped. It will probably be difficult to find any which will prove very serviceable below the ninth or tenth year, and it is doubtful anyway whether a test of this nature would be significant before that age. We believe that the addition to our list of a few more difficult fables would make the test especially valuable at the upper end of the scale and help a great deal in the difficult task of extending the scale beyond 13 years. Finally, it should be said that this test is one which gives little opportunity for coaching. The child who has been given a number of such fables along with 20 or 30 other tests, can not bear away much accurate testimony as to what he has been put through, and even if he related a fable to another child the latter would not as a rule profit from the acquaintance thus gained. In fact we have found that an S's previous familiarity with the fables does not necessarily increase in the least his chance of winning a high score in our test. It was learned that in the fifth grade room tested by us, all of the 35 pupils had read some of the fables of our list and 12 of the pupils all of them within a few months preceding, but a careful comparison of their papers with others written by pupils of like age and advancement who had met none of the fables, disclosed no effects whatever of such familiarity. The case might have been somewhat different had the fables been taught to the children with the conscious purpose of pointing the moral, but even this effect, we are convinced, is easily overestimated. If the fable situation is beyond the child's power of comprehension the teaching is ineffective as far as moral lessons are concerned, and may not noticeably influence the reaction to the test.

From the above it is clear that the effective use of proverbs, mottoes, fables and other snatches of literature in the moral instruction of children is absolutely dependent upon their standardization according to difficulty of comprehension. Much, if not most, of school instruction in history and literature, has in the minds of those who make the curriculum, a moral purpose; but we do not know how much of this instruction is utterly futile as far as nourishing moral growth is con-

cerned. To make it effective, norms of children's power of comprehension and generalization must be established for different ages and for different kinds of subject matter. There is reason to suspect that in this field, at present, our schools are rife with precocious attempts at generalization. The problem becomes so much the more important in those countries where this type of moral instruction in the schools is purposely and universally adopted as a national system of developing morality, as in France.

(Continued in the April number).

QUALITIES OF MERIT IN SECONDARY SCHOOL TEACHERS.

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SUMMARY.

1. Among the high-school teachers compared, sex had little or no effect on teaching efficiency, except that women seem to have a slight advantage among the teachers whose qualities of merit were studied.

2. The best teachers are found in the oldest established subjects—Latin and mathematics.

3. Advanced work in college or university and professional training are important factors in successful high-school teaching.

4. Experience has an important place in modifying teaching efficiency, but does not seem to be so important as is sometimes thought.

5. Instructional skill, results, stimulation of individuals, intellectual capacity, and discipline rank highest among the specific qualities of merit.

This investigation is similar in character to one conducted by Professors Ruediger and Strayer concerning qualities of merit in elementary teachers.¹ The specific qualities of merit are taken from a list proposed by Prof. E. C. Elliott of Wisconsin as a basis of measuring teaching efficiency.²

Method.—Blanks were prepared having on one side columns headed:

1. Rank in General Merit.
2. Sex.
3. Subjects Taught.
4. Preparation.

1. High School, College or University.

¹Journal of Educational Psychology, May, 1910, Vol. 1, No. 5.

²Published by the Department of Public Instruction, Madison, 1910.

2. Professional (Normal, Teachers' College, or Educational Courses).

5. Years of Experience.

Rank in General Merit was indicated by capital letters A, B, C, etc. There were spaces in these columns for twenty-three teachers.

On the opposite side of the sheet was a list of twenty-one specific qualities of merit, with twenty-three numbered columns beside it in which to indicate the rank of any individual in any quality.

The list of single qualities follows:

- | | |
|---------------------------|-------------------------------------|
| Physical— | 2. Instructional skill. |
| 1. General appearance. | 3. Governmental skill (discipline). |
| 2. Health. | 4. Studiousness. |
| 3. Voice. | Achievement— |
| 4. Energy and endurance. | 1. Success of pupils (results). |
| Moral— | 2. Stimulation of individuals. |
| 1. Self control. | 3. Stimulation of community. |
| 2. Sympathy—Tact. | Social Spirit— |
| 3. Adaptability. | 1. Interest in life of school. |
| 4. Sense of humor. | 2. Interest in life of community. |
| 5. Fair mindedness. | |
| Administrative— | |
| 1. Initiative. | |
| 2. Executive capacity. | |
| 3. Co-operation. | |
| Dynamic— | |
| 1. Intellectual capacity. | |

The following directions were printed on separate sheet of paper and sent with each blank:

1. The teachers are to be ranked first in the order of their merit. Grades are not to be assigned. All that is wanted is relative position.

Thus—A will stand for the teacher best in general teaching ability, B for the second best, etc. Information as to sex, subjects taught, preparation, and years of experience is desired in this connection. Please indicate whether the teacher is a normal-school graduate, a university graduate, or both, or neither.

2. Letting the letters represent the different teachers, next rank them according to the various single qualities of merit, of which there are twenty-one on the opposite side of the sheet.

Thus—If A is best in General Appearance put the letter A opposite General Appearance in column one, if second, put in column two, and so on.

A letter of explanation and a stamped envelope for reply also accompanied each blank.

These blanks and requests for the information were sent to about 235 superintendents and principals. Reports were received from 38 high school in 14 States, most of them coming from the North Central and Middle Atlantic States. Twenty-seven reports were properly filled out in full or nearly so. Two reports were not filled out according to directions. Seven reports were filled out as to general merit and items on that side, ranking in specific qualities being too tedious or too difficult. One report had only four teachers compared, and was not used. The smallest number of teachers in any report used was five, the highest 23. The average number for the 27 reports was 12.7.

The value of any questionnaire investigation depends on the care with which the data are given. Notwithstanding the obvious difficulties in ranking a large number of individuals in each of the various qualities named, the writer believes it can be done, and that it has been done with a fair degree of accuracy in the cases used in these results. It would be a remarkably uniform corps of teachers in whom there was no difference. It is inconceivable that they should be all the same. It depends on the skill of the supervisor whether the difference is detected. The difficulty of the problem prevented any hasty or ill-considered reply, as those who did not have time to reply at least somewhat thoughtfully, replied only in part or not at all. Again, the method of correlation would discount slight variations from the true ranking.

Method of Correlation.—The method of correlation used in finding the coefficient of correlation between General Merit and the various specific qualities, and between the specific qualities themselves, was that used by Karl Pearson in finding the relationship between qualities not quantitatively measurable. The coefficient of correlation (r) is 1.00 when there is perfect relationship; that is when one quality is invariably accompanied in the same degree by the other related quality. When r is -1.00 the two qualities are mutually exclusive. When $r = .00$ nothing can be known about the relationship. All values of r , then, between .00 and 1.00 indicate

positive correlation, and values between .00 and — 1.00 negative correlation. Thus, $r = .36$ means that with a given amount of one quality there will probably be .36 of the related quality. The formula ³ used was:

$$r = \cos \frac{\sqrt{bc}}{\sqrt{ad} + \sqrt{bc}} \pi$$

in which

a = the number of cases in which individuals are above the median rank in both of the qualities compared.

b = the number of cases in which individuals are above in the first quality and below in the second.

c = the number of cases in which the individuals are below in the first quality and above in the second.

d = the number of cases in which individuals are below in both qualities.

Thus taking one report comparing General Merit and General Appearance:

Rank in General Merit.	Rank in General Appearance.
1	7
2	3
3	14
4	12
5	1
6	8
7	6
8	11
9	4
10	13
11	9
12	2
13	5
14	10

Comparing the rankings in the two qualities we see that the individual who ranked 1st in Merit ranked 7th in Appearance, the second ranked 3d, etc. The median is between 7 and 8.

³For an elaborate explanation of this method see K. Pearson, *Philosophical Transactions of the Royal Society, Series A, Vol. 195, pp. 1-47.*

See also Whipple, *Manual of Mental and Physical Tests*, pp. 38, 39.

Making a fourfold classification of these rankings we have Table I.

TABLE I.

Quality.	General Appearance.		
	Rank.	Above M.	Below M.
General Merit.	Above M.	4	3
	Below M.	3	4

Hence for this report

$$a = 4, b = 3, c = 3 \text{ and } d = 4.$$

Combining all the reports on General Merit and General Appearance we have Table II.

TABLE II.

Quality.	General Appearance.			Totals.
	Rank.	Above M.	Below M.	
General Merit.	Above M.	101.5	70	171.5
	Below M.	61.5	110	171.5
Totals.		163	180	343

$$a = 101.5, b = 70, c = 61.5, d = 110.$$

Substituting these values in the formula and solving we have

$$r = .36.$$

Leaving the specific qualities of merit to be correlated with General Merit later, let us see what relation sex, subjects taught, preparation, and experience have with teaching efficiency.

In these classifications where the Pearson co-efficient has not been worked out, I have divided the teachers arbitrarily into three classes, good, medium, and poor. By "good" is meant those ranked first or second; by "poor," those ranked last or next to last; by "medium," all others between these two. Because teachers are ranked last or next to last does not necessarily mean that they are really poor teachers. It simply means that of all the teachers with whom they were compared they were least good. I felt safe in making this classification because in any one quality it is quite likely that one or two teachers would be prominent either for the presence or absence of that quality, while it might be harder to distinguish between the others.

Sex.—The combined information in regard to sex and its relation to teaching merit is given in Table III.

TABLE III.

Item.	Males.	Females.
1. Number	154	250
2. Per cent. of total.....	38	62
3. Good—Number	22	40
4. " —Per cent. of total.....	5.4	9.9
5. " —Per cent. of sex.....	14	16
6. Medium—Number	108	172
7. " —Per cent. of total.....	26.7	42
8. " —Per cent. of sex.....	72	68.8
9. Poor—Number	24	38
10. " —Per cent. of total.....	5.9	9.4
11. " —Per cent. of sex.....	15.5	15.2
12. Pearson (r).....	.00	.00

The statement sometimes made that men make better high-school teachers than women is not borne out by these results. In fact, if any difference is shown at all, it is slightly in favor of the women. Comparing items 2, 4, 7 and 10 we see that the men bear about the same ratio to the women in all, except that the women show a relatively larger per cent. of the total in the group called good than in the others. When items 5, 8, and 11 are compared, the men again show a smaller per cent. of good and a larger per cent. of medium and poor. It was possible for 62 or 40% of the men to rank first or second and only 14% of them did; while out of a possible 24% of the women 16% ranked in the first two classes. The Pearson coefficient, however, shows no relation between sex and teaching efficiency.

Subjects Taught.—Under this head the attempt has been made to find out the distribution of good, medium and poor teachers among the various subjects of the high-school curriculum. Sufficient data were received to compare seven of the common high-school subjects. Where a teacher taught more than one he was placed under the one given first. The following table shows the number teaching each subject and the number and per cent. of those teaching each subject ranked in the three classes.

TABLE IV.

Subject.	No.	Good.		Medium.		Poor.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.
Latin	46	14	30.4	28	60.8	4	8.8
Mathematics ..	59	18	30.9	35	59.3	6	10.2
History	48	7	14.5	36	75	5	10.5
English	83	11	13.2	57	68.6	15	18.2
Science	62	8	12.9	44	70.9	10	16.2
Mod. Language	37	4	10.8	25	67.5	8	21.7
Commercial S.	33	0	0.0	25	75.7	8	24.3

The subjects are ranked in what seems to be the order of their relation to efficiency as indicated by the per cents. of teachers in the various classes. Mathematics and Latin are nearly the same in per cent. of good teachers, but Latin was placed first because it had a larger per cent. of medium and a much smaller per cent. of poor teachers than mathematics. There is a striking difference in the per cents. of good and poor teachers in Latin and mathematics, and science and modern languages. Why should Latin and mathematics stand so far ahead of the others in their relation to general merit? This may perhaps be explained by the fact that Latin and mathematics have been taught for so long that they have become well established as to method and content, and show little change from year to year, while the other subjects, especially science, are newer, and their pedagogy is not yet well worked out.

The writer believes that preparation plays a large part in this distribution. The effect is certainly shown by the condition in commercial teaching, and the value of advanced work is strongly suggested. Of the 33 teachers of commercial subjects, not one ranked first or second. Thirteen of them had had as high as college or university work, four as high as normal, and 16 had had only high-school or business-college training. Only three of the Latin teachers had had less than college or university work, and two of the three had had normal training or educational courses.

The training and education of the supervisors themselves may have something to do with their judgment. That is, if their education has been mostly along the traditional lines they would be better able to judge the excellence of Latin

and mathematics, whereas they might not be able to see the virtues in the science teaching if they were there.

The results indicate the necessity of better training for science, modern language, and commercial teachers, and also a more complete working out of the pedagogy of these subjects.

Preparation.—The information under this head was not given fully in all cases, so that little can be determined as to what part preparation plays in General Merit. Data from 36 reports were used, giving us 72 teachers ranked first and second. Sixty-five of these had had college or university work, 15 normal work, and 24 educational courses in summer school or university, while three had had no preparation beyond high school. It is worth noticing that of these three one had had 41 years of experience, one 32 years, and the third 30 years.

Of the 72 teachers placed last and next to last 63 had been in college or university, and only three in normal school. Twenty had had educational courses or special professional work, and ten had had neither college nor normal training. Of these ten, four had had work in business college or special training school. The average experience of the ten was 13 years, and their median 19 years.

The comparison is slightly in favor of those having professional training for high-school teaching. The effect of meager academic preparation has been pointed out in connection with the teaching of Commercial Subjects.

Experience.—The question to which a partial answer is given by this part of the data is this: How important is experience in modifying teaching efficiency? So much stress is laid on experience by superintendents and others in judging a teacher's qualifications for a position that it is interesting to get any information as to its real importance. Table V is its own best explanation. It shows the average and median years of experience for all, and for men and women separately, and also for the various groups of efficiency.

TABLE V.

Men and Women.				Men.			Women.		
	No.	Av. Yrs.	Median. Yrs.	No.	Av. Yrs.	Median. Yrs.	No.	Av. Yrs.	Median. Yrs.
Good ...	68	11.8	10.1	20	10.25	10	40	11.6	9.5
Medium. ...	298	8.7	6.1	99	8.31	7.1	165	8.8	5.26
Poor ...	68	6.39	4.1	21	6.	4.5	38	8.	5.5
Total..	434	8.96	6.17	140	8.28	6.25	243	9.2	5.4

No teacher was ranked first or second who had had less than three years of experience.

The Pearson coefficient between General Merit and Experience was .43, with a P.E. of .053.

Both the table and the Pearson coefficient indicate a positive correlation between Experience and teaching efficiency. All averages and medians decrease with the rank in merit. All medians are below their corresponding averages, showing that the majority of teachers have less than the average years of experience. This is also shown by Table VI. The averages for men are lower than those for women, but the medians are higher, except in those ranked poor. If we considered only the averages of all the men and all the women we might conclude that the women stay in the service longer, but the medians would indicate the opposite. The medians would also tend to show that the women reach maximal efficiency sooner than men.

Another interesting comparison is made in Table VI, in which the years of experience are grouped by fives, except those beyond 20, and the distribution again made.

TABLE VI.

Years.	No.	Good.		Medium.		Poor.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.
1-5	160	15	9.3	109	68.1	36	22.6
6-10	138	25	18.1	96	69.5	17	12.4
11-15	65	15	23.	42	64.6	8	12.4
16-20	29	6	20.6	19	65.5	4	13.9
21-46	28	6	21.4	20	71.4	2	7.2

It is to be noticed that there is a decided falling off in numbers between the second and third groups. Seventy per

Note—The total of men and women is greater than the sum of the men and women in the table, as use was made of some reports for the total in which sex was not specified.

cent. of all are in the first two groups. The increase in efficiency is very great from 1 to 10 years, a little less decided from 10 to 15, and efficiency as indicated by the per cent. of good teachers falls off slightly from 15 to 46, but the medium group increases in that time.

The place which experience occupies when compared with other qualities is shown in Table VII. Although its coefficient is positive, it seems not to be so important as other qualities upon which less stress is placed.

The Correlations of the Specific Qualities of Merit with General Merit.—The list of qualities taken to be correlated with General Merit is not an exhaustive one, nor is this study, as a whole, exhaustive. Many such studies and many lists of qualities will have to be made and remade before we can know with much certainty what constitutes General Merit in its entirety. The list is merely suggestive. It includes points on various sides of the teacher's character, life, work, and that mysterious thing we call personality. Instead of using personality as one of the qualities we have broken it up into different possible components and tried to get something more definite and more easily understood. The combined results should give us the composite opinion of our correspondents as to which of these qualities are most important as exemplified in their teachers. They will give us the qualities not as they are in an ideal teacher, but the extent to which the qualities named are found in teachers actually in service.

The results obtained by combining the reports of ranking in these qualities are given in Table VII, which shows the Pearson coefficient, the Probable Error, the number of teachers compared for each quality, and the rank of each quality in the list.

The quality which ranks far above all others is Instructional Skill, with its correlation of .90. Next in order come Results and Stimulation of Individuals with their coefficients of .85 and .80, respectively. These three, with Intellectual Capacity .71 and Discipline .67, seem to be the single qualities deemed most important by supervisors, and are the qualities, perhaps, which are most likely to be determining factors in a high-

school teacher's success; all the other qualities, except General Appearance and Health, show high correlation with Teaching Efficiency. As a group the physical qualities rank lowest and the dynamic and achievement qualities highest. Superintendents are evidently looking for results. It will be noted that Experience ranks third from the last, which may indicate that Experience is not always so important as is maintained. The correlation of the moral qualities and the physical qualities of Voice and Energy with efficiency are high, but when compared with the other qualities they seem to be less important. The moral qualities are certainly as important as, if not more important, than administrative ability, and yet it seems to be the administrative side which is emphasized. The teachers are decidedly weak in Health and General Appearance. The low correlation of Health indicates either that good teaching is very hard on those engaged in it or that teaching does not attract a very strong class of people into its ranks,—or that the disadvantage of relatively poor health may be overcome by exertion.

TABLE VII.

General Merit and Physical—	Rank.	r.	P. E.	Number.
1. General appearance.....	21	.36	.059	343
2. Health	22	.18	.062	311
3. Voice	16	.50	.059	343
4. Energy and endurance.....	15	.51	.059	343
Moral—				
1. Self control.....	13	.52	.06	326
2. Sympathy—Tact	17	.45	.059	343
3. Adaptability	11	.59	.06	330
4. Sense of humor.....	19	.44	.059	343
5. Fair mindedness	18	.45	.062	310
Administrative—				
1. Initiative	9	.62	.06	330
2. Executive capacity.....	10	.62	.06	330
3. Co-operation	6	.66	.061	323
Dynamic—				
1. Intellectual capacity.....	4	.71	.06	328
2. Instructional skill.....	1	.90	.059	343
3. Governmental skill (discipline).....	5	.67	.059	343
4. Stidiousness	7	.65	.06	328
Achievement—				
1. Success of pupils (results).....	2	.85	.059	343
2. Stimulation of individuals.....	3	.80	.06	325
3. Stimulation of community.....	14	.52	.066	276
Social Spirit—				
1. Interest in life of school	8	.64	.062	310
2. Interest in life of community	12	.57	.064	289
3. Experience	20	.43	.053	421

Other Correlations.—It would be possible, of course, but of doubtful profit to correlate every quality with every other quality, but only a few of the inter-correlations which promised interesting possibilities are given here.

Since Instructional Skill is so important, what are the qualities upon which it depends? Is it a matter of training, experience, or native ability? To see if this could be determined, Instructional Skill has been related with some of these possible modifying factors, and the results combined in Table VIII.

TABLE VIII.
Instructional Skill.

Correlated with	r.	P. E.	Number.
Intellectual capacity.....	.65	.06	328
Studiosness .....	.61	.06	328
Adaptability .....	.53	.06	330
Experience .....	.40	.061	322

If Intellectual Capacity is a quality which cannot be modified, it would appear that Instructional Skill depends very largely on native ability. But it is a point of great encouragement that it depends nearly as much on Studiosness. The coefficient of Experience is strikingly low compared with the others when we might expect in this case rather a high correlation.

Another much desired bit of information which might come from inter-correlations is that of the basis of Results. That is what the teacher is judged by largely, and Results are what the teacher himself wants. He wants to see the success of his pupils. Upon what do Results depend? In order to determine this, if possible, Success of Pupils was correlated with several qualities, with the following result:

TABLE IX.
Success of Pupils.

Correlated with	r.	P. E.	Number.
Instructional skill.....	.86	.059	343
Discipline .....	.74	.059	343
Intellectual capacity.....	.69	.06	328
Adaptability .....	.55	.06	330
Sympathy-Test .....	.51	.059	343
Experience .....	.50	.061	318

As we might expect, the success of the pupils depends most on the instructional skill of the teacher. Ability to keep order is more important than Intellectual Capacity.

When we compare these results with those from Ruediger and Strayer's investigation of elementary teachers we find points which tend to confirm the results of both, and yet if the findings in the two cases can be taken as typical of elementary and secondary teachers, there are differences which show some different conditions in the two.

All of our coefficients of correlation in the present study are higher than the corresponding coefficients of the earlier study. Thus our highest correlation is .90, theirs .56; our lowest is .18, and their lowest .04. This difference may be due to method of correlation, or to actual difference between the relation of these qualities to Merit in high-school and elementary teachers, though such a great difference is unlikely.

The quality which had highest correlation with teaching efficiency in elementary teachers was Discipline, with Instructional Skill and Initiative ranking second and third. The coefficients of Instructional Skill and Discipline were respectively .56 and .54 in their study, and .90 and .67 in the present investigation, showing the much greater relative importance of Discipline in the grades. Health and Appearance ranked lowest with elementary teachers, as they did with high-school teachers.

In the matter of Experience there are some differences, but the results tend to the same conclusion, namely, that Experience is an important factor in modifying teaching ability. No elementary teacher ranked first or second with less than five years of experience. Among high-school teachers three years was the minimum for good teachers. The average experience of elementary teachers for the first and second classes was 13 years, and for the last two classes 8.5 years. The average experience of high-school teachers for these corresponding groups was 11.8 years, and 6.39 years, respectively. The averages for the totals were 10 years for grade teachers and 8.96 years for those in high school. All of which would seem to show that elementary teachers remain in the profession longer than high-school teachers. This is shown also by the fact that of the elementary teachers 25% had taught less than 5 years, and 26% more than 14 years, while of the high-

school teachers 39% had taught 5 years or less, and only 13.9% more than 15 years.

Little direct comparison can be made as to preparation. It is noticed, however, that college graduates are predominantly the best high-school teachers, but are not particularly successful in the grades.

In conclusion I wish to acknowledge my very great indebtedness to the superintendents and principals who have furnished the original data for the results given here. It was no small task which was asked of them, and many such requests added to their already heavy work, makes their replies all the more to be appreciated. It is only from those nearest the actual teaching work that such information can be obtained, and it is to be hoped that they are contributing something which may in the end contribute a little toward easing the burden placed on them.

COMMUNICATIONS AND DISCUSSIONS.

CONTINUATION SCHOOL FOR GIRLS.

In our December issue attention was called to the program of the second annual meeting of the American Association for Study and Prevention of Infant Mortality, held at Chicago, November 16-18, 1911. The chairman of the section on education, Dr. Helen C. Putnam, has favored us with a copy of the resolutions reported by this section and unanimously adopted by the association, and these impress us as of particular significance in the light of present-day interest in the continuation school, so largely restricted to boys.

Inasmuch as our infant mortality rate is unnecessarily high (estimated by one federal official as 22d, by another as 18th in the list of 31 civilized countries, although in national wealth we easily lead all), and

Inasmuch as this is largely due to lack of education of young men and women for parenthood, home-making and care of children, and

Inasmuch as the very great majority of pupils leave school before the age when this instruction can be effectively completed, and rarely have a later opportunity of receiving it, being often deprived of proper education in parental homes by occupations, environment, or social conditions,

Therefore be it resolved that the American Association for Study and Prevention of Infant Mortality petition each State Board of Education to appoint a Commission on Continuation Schools for Home-Making, to consist of men and women technically qualified in home economics, sociology, school administration and medicine, to study conditions and needs in the state, and to report efficient plans for meeting them through such continuation schools or classes.

Resolved that such schools should be conducted wherever possible in model houses or flats, in addition to classroom work; that care of infants, children and the sick be

practiced in connection with homes, day nurseries, asylums, hospitals, kindergartens, visiting nurses, children's summer outings, or in other practical ways.

Resolved that special effort be made to create day continuation schools, as well as, or in preference to, evening schools, and also to secure co-operation of employers in arrangements for part-time schools.

Resolved that the association be requested to continue the discussion of this topic at a future meeting.

Those who are in touch with social and educational problems will agree that the demand for the kind of teaching contemplated in these schools exceeds that for any of the trades represented in our present vocational schools. It may be questioned whether the "Little Mothers" classes in operation in some of our cities—classes in which girls of ten to fourteen years are taught how to wash, dress and feed babies—are of so much value as appears on superficial view. Sociological considerations would suggest that babies need real mothers, while psychological considerations would suggest that ten-year-old girls could more advantageously be taught to be "Big Sisters" or "Mothers' Helpers." The merit and the novelty of the plan proposed in these resolutions lies in part in the postponement of instruction in the problems of motherhood to the period of 16 years and over, when the recipients of the instruction have arrived at the age of possible motherhood, so that the instruction is brought nearer the time when it is needed for use and is given to pupils of maturer and more appropriate stage of mental development.

The curriculum of continuation schools of home-making will be further discussed at the 1912 meeting of the association at Cleveland.

GUY MONTROSE WHIPPLE.

THE VALUE OF JUVENILE LITERATURE IN TEACHING EDUCATIONAL PSYCHOLOGY.

In my article in the December number of the JOURNAL OF EDUCATIONAL PSYCHOLOGY, entitled "The Aims, Values and Methods of Teaching Psychology in a Normal School," I neglected to mention the use that teachers may make of some of the juvenile literature. I find it of great value in my beginning courses in psychology in

getting students interested in children. Such books as Thomas Bailey Aldrich's "The Story of a Bad Boy," Charles Dudley Warner's "Being a Boy," Mark Twain's "The Adventures of Tom Sawyer," Eugene Field's stories and poems, and other numerous sources of this kind are all stimulating. I do not mean to advocate the study of these books in class. A teacher through proper suggestions may easily get students to take home some of these books at the end of the week. In the course of a year countless volumes may be read. Lovers of pure psychology may object to this plan on the ground that it is a prostitution of the science and a dangerous way of teaching psychology. I do not find that erroneous ideas about children are gained thereby to any appreciable extent, and I do know that the reading of this literature gets them interested in their own childhood and in the observation of children. This interest having been once aroused can be *directed* and *trained* along various lines of practical educational psychology.

J. MACE ANDRESS.

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NEEDED RESEARCH ON THE PROGRAMME OF STUDIES.¹

Many, if not most, of the great problems with reference to the programme of studies have been raised; some have been carefully studied; others have been scarcely touched; and none have been settled in such a way that their solutions offer an accepted guide to practice. The Germans have done most in this field; Winch in England has done something; and Burnham in this country has done a great deal. A list of some of these questions may serve to point the direction which research will have to take.

- (1) Which is the better, one or two sessions a day?
- (2) What should be the length of sessions for the different grades?
- (3) Are shorter sessions for six days of the week better than longer ones for five days?
- (4) Are a number of short vacations better than one or two longer ones?
- (5) What seasons of the year are most conducive for good school work?

¹Read at the Wellesley meeting of the New England Association of College Teachers of Education, December 2, 1911.

(6) What are the best days of the week for good school work?
(7) What should be the length of the school year?
(8) What hours of the day are best for hard study?
(9) How does the work of evening classes compare with that of day classes?

(10) How many studies can a pupil pursue in the different grades to his greatest profit?

(11) What should be the length of the recitation in the different grades?

(12) What is the best length of intermission for the different grades? Should it lengthen as day advances? How should the pupil use this intermission?

(13) Should studies of relatively high correlation on the content side be grouped in same term?

(14) What is the *fatigue coefficient* of the different studies? Is mathematics a more fatiguing study than Latin, for example? Ought two or more studies apparently involving great eye strain come together?

(15) What should be the length of the lunch period?

(16) At what time may home study begin? How much and what kind of home study may be demanded?

(17) Should there be formal examination and review periods?

The nature of these questions shows at once how difficult their answers are. The study of fatigue alone will never settle them. The students of this subject today insist on the fact that subjective conditions are no test for the existence of fatigue; and yet these conditions are of vital importance in arranging a schedule of studies. The nature of the child, his physical make-up, his interests and power of attention are all of the highest importance in this matter. It is impossible to determine the fatigue effects of a study without knowing more than the nature of the subject-matter contained in that study: the personalities of the teacher and child must also be considered. The difference between two Latin lessons may be greater on the fatigue side than the difference between a Latin and a drawing lesson. The same might be said regarding the length of recitation: a long recitation under one teacher might tire a child far less than a short recitation on the same lesson in the hands of another teacher.

When one views the questions relative to the programme of studies in the light of all the conditioning factors, one may well doubt

whether some of the problems are not almost impossible of solution. Nevertheless, this is no argument against the scientific attack of these problems. Enough has already been done to show that great good may come from such research. For example, it seems quite well established that in the high school, under average conditions, mathematics and the ancient languages are the hardest studies, and that in the elementary school arithmetic, reading and dictation are harder than drawing and nature study. It seems also to be established that gymnastics is a very fatiguing subject, quite contrary to current opinion. The length of the recitation period for the different ages seems, too, to be on the way to solution: fifteen to twenty minutes for children from six to nine; twenty-five to thirty minutes for children from nine to twelve; thirty-five to forty minutes for children from twelve to fourteen, and forty to forty-five for older children. (Burnham, Second International Congress of School Hygiene. Vol. 1, pp. 35-36.)

However uninviting this field may seem, nevertheless, some of the most important educational problems today are wrapped up in the questions bearing upon the programme of studies. The programme of studies is the course of study functioning. Much study has been devoted to the course of study, but not nearly so much to its functioning. School hygiene, school administration and organization, educational psychology, and even educational theory, await with eagerness research within this more modest and yet more vital topic of the programme of studies. As in method, what is needed here is less talk and more work.

CLAYTON C. KOHL.

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RELATIONS OF RESEARCH TO THE WORK OF THE SCHOOLS.¹

I. In discussing the place of research work with reference to the public schools, it is desirable to make use of analogies with medicine, engineering, scientific agriculture, etc. At present there is a disposition to ask teachers, both in investigation and in applying the results of investigation, to have themselves covered a broad field of scientific study. In medicine the larger problems of research are much specialized. On the other hand, each physician may do a little highly specialized experimenting in the course of his practice, provided the

¹Memoranda of remarks made at the meeting of the New England College Teachers of Education at Wellesley College, December 2, 1911.

lines are distinctly indicated. The world has only a few great geologists, yet every graduate student can, on the basis of accepted methods, explore a new hillside or ravine, and do it in a way to add to the world's stock of knowledge.

II. The leaders in research work in education must so familiarize themselves with the work of the schools and the necessities of education in general that they can, if necessary, indicate specific problems to the rank and file of teachers, many of whom can make important contributions, both in the field of method and in the field of diagnosis. Many intelligent teachers could study retarded children in the light of a syllabus or analysis made by some competent director. Similarly, with regard to applications of the results of research. These must not only be adapted to the particular problems with which teachers have to deal, but also be couched in language comprehensible by the every-day superintendent and teacher. The success of the great modern research work in agriculture has been largely along these lines. The results of that research are made available for every farmer in the simplest of language and by means of objective presentation. Teachers are eager to discover new and better ways of teaching reading in the first grade, penmanship in the second, or in choosing home reading in the fifth. The research specialist who as a result of his work will be able to offer concrete suggestions here will find a hearty response. Too often we tend to give to these teachers only such general principles as the culture epoch theory, leaving them to make all sorts of speculative and uncertain applications.

III. Probably another step in relating research work to the schools is a conscious separation between those educational processes which lend themselves rather definitely to measurements and exact statement, and those other operations where the results of the trial and error method must still be accepted. Primary reading, spelling and penmanship are tending to go over into the first category. The teaching of reading in the upper grades, however, is yet so ill-defined as to aims and methods, that no very exact analysis is possible. How to teach the multiplication table can be carefully studied, but how to teach the applications of the fundamental processes in the larger problems seems yet to be uncertain territory, where guess-work must prevail. Teachers and educators generally would be helped greatly if the results of research were so presented that a fairly clear distinction could be made between regions where scientific methods now apply and those in which they confessedly do not serve us.

DAVID SNEDDEN.

Commissioner of Education for Massachusetts.

CORRELATION BETWEEN AGES AND GRADES.

The following are the results of an investigation into the ages and grades of the students of the University of Illinois. The data were taken from the records of the registrar and consist of the ages and averages of grades (no less than three grades being considered in any case) made throughout the year 1909-1910 (including the summer session, if attended), by 1306 men and 644 women, all considered in the alphabetical order of their names. The entire number of women enrolled were considered.

The passing grade is 70. Of course, grades given for military and physical training were disregarded because of their invariably high value. All grades below 45 were considered as 45, "failures" as 55, and "absent" from examinations, as 65. The number of grades for each student averaged about 13 or 14. Whenever a student is said to be aged, say 24, we should have in mind for discussion 24.5, for such a student may be anywhere from 24 to 25. It is an interesting fact that for both sexes, cases of extremely isolated and advanced ages showed excellent averages almost invariably. The ages below 31 that occurred for men were 17-30 and for women 18-30. The correlation coefficients between ages and averages of grades were found to be:

$$\begin{array}{lcl}
 \text{Men} & \left\{ \begin{array}{l} r=0.0938-0.0185. \\ \text{Mean grade}=79.9870. \\ \text{Mean age}=22.0214+.5=22.5214. \end{array} \right. \\
 \text{Women} & \left\{ \begin{array}{l} r=0.1996-0.0260. \\ \text{Mean grade}=80.7842. \\ \text{Mean age}=22.2826+.5=22.7826. \end{array} \right.
 \end{array}$$

The results indicate that, on the average, age has a little but a very little favorable effect on scholarship between the ages considered. Both coefficients, though small, are well beyond the probable error.

It seems rather significant that the coefficient for women has more than twice the value of the one for the men. This would suggest, at least, that, if age is an asset in scholarship, it is more so for women than for men.

A comparison of mean or average grades results a little in favor of the women, but perhaps not as much as the champions of the women would claim. It is somewhat surprising to find the average age of the women to exceed that of the men, especially in a state university where students of agriculture and law are included in the investigation.

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NOTES AND NEWS.

In connection with the new "equal pay" salary schedules, the Board of Education of New York City has adopted new conditions **MERIT IN** for salary increases to high school teachers. The **TEACHING.** permanent license will be given, as at present, after a probationary period of three years, and this will ensure the annual increase of \$150 for a further period of three years. In order to have the increase continue, the teacher at the end of the sixth year must satisfy the authorities that his services are worthy of the qualification "fit and meritorious," and at the end of the ninth year a more searching inquiry is made for the award of the distinction of "superior merit." If all requirements are satisfied the teacher attains the maximum salary, \$2650, at the end of the tenth year. While the work of the teacher is under the immediate supervision of the principal and the associate superintendent in charge of high schools, the determination of the qualifications "fit and meritorious" and "of superior merit" rests with the Board of Examiners. This raises the very practical question, how can a board that knows nothing of the daily work of a teacher determine the efficiency of that teacher's service? Can tests of efficiency similar to the Binet tests be devised? What are to be the criteria of merit? Can the matter be determined by a written examination, such as that on which the board chiefly relies for the granting of licenses? As one high school principal emphatically remarked, the one who passes the best examination is by no means invariably the one who makes the best teacher. At present the Board of Examiners seems wisely disposed to leave the matter to the judgment of the principals. J. C. B.

The publishers of Hyde, "Self Measurement," desire us to state that they consider the mimeographing of a table from that book an infringement upon their copyright. This statement is made with reference to our review, this JOURNAL, Vol. II, p. 583. C. E. S.

In an interesting article in *Science*, January 19, Dr. Fisher of the

Department of Physics at Cornell University throws some new light on the question of the popularity of science in high schools. His method has been to compute numerically the opportunity which the average student has to take a given study and compare this with the amount to which he takes advantage of his opportunity, and thus to secure in the ratio of these two quantities a measure of the popularity of each study. He concludes that, "in spite of general impression to the contrary, American boys and girls like the sciences, both exact and natural, better than they like the languages, *provided they only have as good a chance to get at them*; and the way to save the situation for science is to give them the chance early in the course."

The Education Committee of the London County Council have agreed to recommendations of the Education Subcommittee in support of the principle of holding classes for delicate and other suitable children in the playgrounds of selected schools, or in parks and open spaces near selected schools, and that for 1912-13 the sum of \$4500 be expended on the work. Inspectors and head teachers had reported in favor of the experiments already tried in this direction. Where they were taught under open-air conditions it was found that the children were fresher toward the end of the school session, suffered less from colds and minor ailments necessitating absence from school, that there was less dullness and sleepiness, and that the activity, carriage and appearance of the children dealt with had improved. Mentally the children were more alert, and gripped their work better.—*The Educational Times*.

The Fifteenth International Congress on Hygiene and Demography will be held at Washington, D. C., September 23-28, 1912. The President of the United States will be Honorary President of the Congress, and the Department of State has assumed the responsibility of the conduct of the Congress. An exhibition, to be held at the same time with the meetings, will show the recent progress and the present status of the public health movement in the co-operating countries, and especially in the United States. The provisional program of Section III (Hygiene of Infancy and Childhood and School Hygiene) displays an elaborate list of topics, covering hygiene of the home, of the school child, of the school building, of instruction, of the teacher, of open-air schools, hygiene with relation to physical

defects, etc. This section is under the presidency of Dr. A. Jacobi, with Dr. L. H. Gulick as secretary.

The problem of sex education occupies attention in Italy as it does elsewhere. At a recent congress at Florence, where the topic was discussed, the participants endorsed the principle of incorporating instruction in sex in the curricula of existing institutions for the purpose of supplementing the neglected or inadequate home instruction in these matters. The congress revealed differences of opinion as to the type of instruction needed. According to Foa, a knowledge of the physical and social consequences of sexual activity would be sufficient to develop responsibility. According to Prezzolini, this knowledge would not be efficacious without preliminary moral training of the sense of responsibility. Wegener warned of the danger attending instruction in sex by persons who lacked the training and sympathetic knowledge of the teacher. Mayer believed that "flirting" (in the sense of frank and open friendships between individuals of the two sexes, especially as favored by coeducation) was a valuable preventive of degrading love affairs. Assagioli urged the use of the psycho-analytic method of Freud and Ewald to sublimate and turn to profit the valuable energy of sex, saying that the sex instinct may be diverted and utilized, but may not be cheated by illusory satisfaction, nor combatted and repressed as something bestial. Wagner's account of the genesis of Tristan and Isolde was cited as an illustration of the sublimation of the sex instinct to esthetic creation.

According to the report of G. Francia in a recent number of the *Rivista di Psicologia Applicata*, marked success has attended an experiment in colonization of young criminals and mental defectives. Moral regeneration was sought through work, collaboration in the tasks of the household under conditions similar to those obtaining in family life, with the occupations freely chosen so far as possible and adapted to the attainments of the participants. The presence of both sexes proved to have a good effect upon manners and speech.

The seventh annual meeting of the New England Association of College Teachers of Education was held at Wellesley College, Saturday, December 2, 1911. The meeting was presided over by Professor Anna J. McKean, head of the department of education, Wellesley

College, and had as its general subject Research in Education. At the morning session the following papers were read: Needed Research in Method and in the Programme of Studies, Dr. Clayton C. Kohl, Mt. Holyoke College; Needed Research in Administration, Professor Walter B. Jacobs, Brown University; Methods of Research, President Edmund C. Sanford, Clark College. At the afternoon session Professor W. Van Dyke Bingham, Dartmouth College, discussed The Possibility and Value of Research by Students, and Dr. David Snedden, Massachusetts Commissioner of Education, spoke on The Relations of Research to the Work of the Schools. Dr. Kohl's shorter paper and an abstract of Dr. Snedden's remarks will be found in another section of this issue. President Sanford's paper and Dr. Kohl's discussion of research in method will appear in subsequent issues.

There has been established in Geneva an Institute for the Science of Education, which will be opened October 15, 1912. The aim of the institute is to furnish a complete orientation on all questions pertaining to education, taking as a basis the psychology of the child, and to centralize and co-ordinate such observations and experiments as will advance the science of education. M. Pierre Bovet, professor of philosophy and pedagogy at the University of Neuchatel, has been chosen director of the institute, and Prof. Ed. Claparède, director of the psychological laboratory at the University of Geneva, will give instruction in psychology. Anyone who intends to take up the vocation of teaching will be accepted as a pupil at the institute.

The Prussian educational authorities have decided to establish a pedagogical seminary at Halle. It is understood that Prof. Fries, director of the Francke Institution, will probably be offered the position of director of the seminary.

The Institute for Experimental Pedagogy and Psychology, founded by the Leipzig Teachers' Association, is meeting with well deserved success. The attendance at the courses shows a steady growth, and the number of courses offered is constantly increasing. An important feature of the institution's work will be a series of weekly discussions during February and March on the "Fundamental Concepts of Psychology," considered from the point of view of the teacher. A

gratifying number of experimental investigations of educational problems are in progress, and the results will be published in due season. Non-residents may become associate members, receiving all the publications of the institute, on payment of 20 marks annually. Remittances should be made to Lehrer Paul Schlager, Leipzig-Gohlis, Lothringerstr. 79.

The Wisconsin state normal schools have installed two-year college courses in co-operation with the state university. The purpose of these is to reduce the attendance in the freshman and sophomore years at the university. It is expected that these courses will not interfere with the professional work of the normal schools, but will rather reinforce it. The plan brings opportunities for higher education nearer the homes of the people than would be possible otherwise. It is intended that certain of the schools will give the first two years' work of the literary course, while others will offer the first two years of the engineering course, or of the course in agriculture. The success of the plan will be watched with much interest—*Western Journal of Education*.

The primary school teachers of the Canton of Neuchâtel, Switzerland, have published an important report in which they call for a complete reorganization of the studies leading to the profession of teaching. They demand especially that serious instruction in psychology and child physiology be introduced into the normal schools.

On Wednesday, December 27, 1911, there was held at Baylor University, Waco, Texas, the first Conference of Texas Teachers of Philosophy and Psychology. The topics considered at the meeting were (1) Reports from colleges on teaching and on work in progress; (2) The philosophy of Henri Bergson; (3) Discussion: "How to popularize philosophy in Texas colleges"; (4) General intelligence and a sex difference; and (5) Discussion: "The place of psychology in the college curriculum."

Prof. Bird T. Baldwin, of the University of Texas, is making an interesting comparative study of 200 individual growth curves, showing the increase in height, weight, and lung capacity of the same group of children during their scholastic age. The results frequently show a decided difference between chronological and

physiological age, and indicate that children below the average height almost invariably weigh less and have less lung capacity. The details of the investigation will appear in a special bulletin of the United States Bureau of Education.

In a recent number of the *Journal für Psychologie und Neurologie* (Bd. 17, H, 3-4.) R. Henneberg has reported the results of some interesting comparative measurements of the superficial area of the cerebral cortex. Examination of three European brains showed an average for a single hemisphere of 111,300 sq. mm., while the total free surface of the two hemispheres averaged 79,288 sq. mm. This confirms Wagner's law that the free surface is to the portion concealed in the sulci as 1:2. The exact figures in each case were 1:1.832, 1:1.966, and 1:2.226. The brains of a Javanese, a Hottentot, and a Herero showed the ratios of free surface to involuted cortex to be 1:1.792, 1:1.5845, and 1:1.464 respectively. The ratio of the area of the three frontal convolutions to the total area was as follows: European I, 1:3.118; European II, 1:3.676; European III, 1:3.751; child of five months, 1:3.696; Hottentot, 1:3.094; Javanese, 1:3.255; Herero, 1:3.740; a general paralytic, 1:3.577; a senile dement, 1:4.140. It will be seen from this that the largest relative frontal area is shown by the Hottentot.

In a recent series of lectures and discussions arranged by the Child Study Society, London, the following subjects were considered: "Co-education during adolescence," "Psychology and grammar," "Psychology of speech," "Psychology of reading," and "Psychology of mathematics."

The school census of the State of Wisconsin, on the basis of which the state school fund is apportioned, shows the surprising fact that "there are 6,236 fewer persons of school age reported for the year ending June 30, 1911, than for the year ending June 30, 1910. The loss in the number of persons of school age is pretty well distributed over the state. Excluding cities under city superintendents, only 24 of the 71 counties show a gain. Of the 68 cities under city superintendents 38 show a gain in school population."—*Science*.

The officers of the first International Eugenics Congress, to be held at the University of London, July 24-30, 1912, hope that the

congress will result in a far wider recognition of the necessity for an immediate and serious consideration of eugenic problems in all civilized countries. The proof of this necessity must be based on the laws of heredity, on the history of the changes in racial characteristics in the past, and on what is known concerning the effect of all the many biological and social factors which tend either to improve or deteriorate the innate qualities of mankind.

Figures prepared by the Bureau of Education indicate that the public school system, as measured by value of property, money expended and number of teachers employed, has nearly doubled during the decade 1900 to 1910. The number of high school teachers increased from about 20,000 to more than 41,000, and annual expenditures to normal schools for the training of teachers from \$2,769,000 to \$6,620,000 during the decade.

The Minnesota Legislature, during the session of 1911, made an annual appropriation of \$5000 for each of the two following years for "Clinical and Scientific Work for the Hospitals for Insane, School for Feeble-Minded and Penal Institutions." The expenditure of this money is to be made under the direction of the State Board of Control. This board appointed a committee to report upon the best method of procedure. The committee unanimously recommended that the initial work be started at the School for Feeble-Minded and Colony of Epileptics, and that one field worker should be secured and started immediately. Miss Saidee Devitt was placed in the field in October, 1911. Up to the present time she has done the preliminary work on 25 cases, six of which have been carefully charted. So far as the work has proceeded and a knowledge of what is proposed has been disseminated, the reaction of public sentiment has been sympathetic and favorable.

A law enacted by the State of New Jersey during the session of 1911 provides that "The Commissioner of Education shall prescribe such method as to him may seem best for use in ascertaining what children are three years or more below the normal."

It is stated in the daily press that Mrs. Ella Flagg Young, superintendent of schools in Chicago, is preparing a course in "sane physiology" for young boys and girls. In 56 of the Chicago schools the girls are being taught the care of babies and young children.

Dr. Edmund B. Huey, recently appointed lecturer on mental development in Johns Hopkins University and assistant in the Phipps Clinic in the hospital, is delivering a series of weekly public lectures on backward and feeble-minded children, and related phases of clinical psychology. The course includes a discussion of the status of clinical psychology, the classification of backward and feeble-minded children, the use of the Binet scale with illustrations from clinical practice, unstable, dull and epileptic children, language disturbances, high grade defectives, growth and recapitulation, the effects of environment upon mental development, play and work, the social aspect of mind, the nature of intelligence, character, disposition, and infantilism and retardation. The course has reference, on the one hand, to the needs of social workers, physicians, teachers, and others who have to do with defectives; and, on the other hand, to the more theoretical interest in these problems by students of psychology, sociology and education.

Dr. E. G. Cooley, of Chicago, has been giving a series of lectures at the University of Illinois on "Vocational Education in Germany." Dr. Cooley recently visited Germany as the representative of the Chicago Commercial Club, and made a careful and thorough study of German vocational conditions and the means employed to secure vocational training.

On Monday, January 8, Prof. Lester M. Ward, of Brown University, delivered an address before the Phi Beta Kappa of Wellesley College on "The Education Which Educates." On the same day Dr. David Snedden, Commissioner of Education in Massachusetts, spoke to the students on "Problems in Education."

President G. Stanley Hall, of Clark University, delivered the address at the inauguration of Dr. George E. Myers, principal of the State Manual Training Normal School at Pittsburg, Kan. The subject of the address was "Educational Efficiency."

Prof. Ernst Dürer, who recently edited the second edition of *Grundzüge der Psychologie*, Vol. I, by the late Hermann Ebbinghaus, now promises the completion of Vol. II, only the first section of which had been issued at the time of the author's death. The publishers, Veit and Co., Leipzig, state that the volume will comprise seven or eight numbers, at M. 1.80 each.

At the recent meeting of the American Psychological Association in Washington Prof. Edward L. Thorndike, of Teachers' College, Columbia University, was elected president for the ensuing year. Prof. J. McKeen Cattell, of Columbia University, was elected vice-president of Section L (Education), of the American Association for the Advancement of Science.

It is stated that Professor Theodor Ziehen, director of the psychiatric and neurologic clinic in Berlin, will resign his position at the end of the winter semester and discontinue all medical work, in order to devote himself exclusively to research in psychology. For this purpose he will remove to Wiesbaden, where he will erect for himself a private psychological laboratory.—*Science*.

Professor Hugo Münsterberg of Harvard University delivered the second series of lectures on the Ichabod Spencer foundation at Union College. Professor Münsterberg chose as his subject "Applied Psychology."

Dr. Anna J. McKeag, president-elect of Wilson College, Chambersburg, Pa., assumed the duties of her new position on February 1. President McKeag's official inauguration will take place about May 1.

Professor E. A. Kirkpatrick, State Normal School, Fitchburg, Mass., has been given a half year's leave of absence, which he will spend in Europe studying educational conditions. It is to be hoped that the college custom of granting sabbatical leave of absence will be extended more generally to normal schools.

Professor John B. Watson of the Johns Hopkins University has recently been granted a three years' appointment as a research associate of the Carnegie Institution of Washington.—*Journal of Philosophy, Psychology and Scientific Methods*.

Dr. J. E. Wallace Wallin, who has been engaged recently in the clinics of Johns Hopkins Hospital, and in New York City in the study of special defectives, juvenile defectives and various types of mental defectives, has been appointed assistant professor of educational psychology and director of the psychological clinic in the School of Education of the University of Pittsburgh. A department

of clinical psychology has recently been established at the University, and will be devoted largely to the psycho-clinical examination of defective children. Professor Wallin will enter upon his new duties March 1.

A. W. Nolan, formerly of West Virginia University, has been appointed assistant professor of agricultural education in the University of Illinois.

Dr. Edward D. Sisson, recently head of the department of education at the University of Washington, has been appointed professor of education in the newly established Reed College, at Portland, Ore.

The Dartmouth Summer School is to be reorganized and incorporated as an integral part of the institution's scheme of education. The standards of the regular session will apply to the summer session as well, and equal credit will be given for equal work done. Dr. W. V. D. Bingham, director of the psychological laboratory, and professor of psychology and education, will be the director of the summer session, and courses in methods of teaching and in school management will be given by Associate Superintendent C. E. Meleney, and District Superintendent D. C. Bardwell, of New York City.

Dr. George H. Mount has resigned his position as instructor in psychology in the Northern Michigan State Normal School to accept an assistant professorship in the Iowa State Teachers' College. He is succeeded at Marquette by Gilbert F. Brown of the University of Wisconsin and of Harvard University.—*Western Journal of Education*.

Mr. Floyd B. Jenks, assistant professor of agricultural education in the Massachusetts Agricultural College, has accepted an appointment in the United States Bureau of Education.

Dr. Rudolph Acher, University of Indiana and Clark University, has been appointed instructor in psychology in the State Normal School at Valley City, N. Dak.

Associate Professor Samuel C. Parker has been made dean of the College of Education of Chicago University.

PUBLICATIONS RECEIVED TO FEBRUARY 1, 1912.

(Notice in this section does not preclude a more extended review).

MANUEL VELAZQUEZ ANDRADE. *Pedagogia de la Educacion Fisica*. Mexico: Castillo, 1911. Pp. 23.

A comparison of the pedagogical principles underlying the German, French, American and Swedish systems of gymnastics shows a fundamental agreement in that all are based upon the biological conditions of growth. From a practical point of view the Ling system is considered superior.

LEONARD P. AYRES. *The Identification of the Misfit Child*. Reprinted from the American School Board Journal, December, 1911. Pp. 11.

Neither the age-grade criterion nor the progress criterion alone is an adequate indication of retardation. A study of the school children of 29 cities, in which both age and progress were determined, shows that some cities stand high in the age classification, but low in the progress classification, and vice versa. A more satisfactory basis is afforded by combining the ratings obtained from the two methods.

LEONARD P. AYRES. *The Money Cost of Repetition versus the Money Saving Through Acceleration*. Reprinted from the American School Board Journal, January, 1912. Pp. 11.

A study of school statistics from twenty-nine cities. The balance of retardation over acceleration is computed in terms of cost to the taxpayers, and the conclusion is drawn that the latter are not getting their money's worth. The reason for this is that the schools are at present adjusted to the bright, rather than to the average, child. We cannot rid ourselves of the feeling that the result of such studies will be to bring pressure to bear upon the teacher to promote pupils, regardless of their fitness. What we need is not more rapid promotion, but a more careful study of the individual child.

LEONARD P. AYRES. *The Relative Responsibility of School and Society for the Over-age Child*. Reprinted from the Journal of Education, December 21, 1911. Pp. 6.

A study of 206,495 school children in twenty-nine cities shows that 37 per cent. of them are above the normal ages for their grades. Thirteen per cent. of the cases were caused by late entrance, and for these society must be held primarily responsible. The school must explain the cases of the 17 per cent. who made slow progress, and

school and society together must account for the remaining 7 per cent.

WILLIAM CHANDLER BAGLEY. *Educational Values*. New York: The Macmillan Company, 1911. Pp. xx, 267. \$1.10 net.

Education involves a modification of conduct in accordance with certain standards or ideas of value. What are these values and in what way can they be made effective in determining conduct? Such is the fundamental inquiry of this book. Before the question can be intelligently attacked the psychological controls of conduct must be examined, and to this the author devotes the first six chapters. In the second part of the work a careful distinction is made between function and value, the chief classes of functions are enumerated, and a detailed analysis is given of the values which are to be realized in fulfilling each type of function. The book stimulates reflection on many important problems of education.

BIRD T. BALDWIN. *Adolescence*. Reprinted from Psychological Bulletin, 8: No. 10, Oct. 15, 1911. Pp. 351-362.

An extended survey of recent literature on this subject.

BIRD T. BALDWIN. *Notes on School Observation. The Physical Nature of the Child*. Bulletin of the University of Texas, June 22, 1911. Pp. 26.

Among the topics emphasized as important for school observation are height, weight, chest girth, lung capacity, head girth, cephalic index, asymmetry, posture, teeth, enlarged tonsils, adenoids and other obstructions, nutrition, vision and hearing. Brief and concise directions are given for making observations on each of these topics.

MAURICE A. BIGELOW. *Biology in Relation to Sex Instruction in Schools and Colleges*. Reprinted from the Journal of Social Diseases, October, 1911. Pp. 6.

Instruction in biology may, and should, contribute to sex education by developing a proper mental attitude, by imparting fundamental information, and by pointing out various practical hygienic applications of physiology and bacteriology. Yet biology affords only a partial contribution: psychology, ethics, sociology and esthetics are quite as important, and the sex problem is complex.

FREDERICK G. BONSER. *Fundamental Values in Industrial Education*. Teachers' College Bulletin, Nov. 18, 1911. Pp. 20. Ten cents.

The author shows in some detail how the materials of the indus-

trial arts may be used to advantage in elementary education, with the result that the whole curriculum would be revitalized, and the child be brought into closer touch with our great social and industrial evolution.

WILLIAM BOYD. *The Educational Theory of Jean Jacques Rousseau.* London and New York: Longmans, Green & Company, 1911. Pp. xiv, 368.

This book will be reviewed in a later number of the JOURNAL.

H. D. COOK UND M. V. FREY. *Der Einfluss der Reizstärke auf den Wert der simultanen Raumschwelle der Haut.* Reprinted from Zeitschrift für Biologie, 1911, Bd. 56. Pp. 537-573.

A very careful study of the effects of simultaneous stimuli upon the skin. Strong stimuli seem farther apart than weak, and give a fairly constant space threshold, which has little dependence on practice, but shows wide individual variations. The paper is of importance in evaluating aesthesiometric studies of fatigue.

JOHN T. DALE. *Heroes and Greathearts and Their Animal Friends.* New York: D. C. Heath & Co., 1911. Pp. x, 240. 60 cents.

A profusely illustrated reader for younger children, in which the dominant thought is the kindness to animals shown by the great men of history and literature. In the effort to be simple the author employs a literary style which is often trivial.

JEAN DAWSON. *The Biology of Physa.* Behavior Monographs, No. 4. New York: Henry Holt & Co., 1911. Pp. iii, 120. \$1.50.

"The physiological state of *Physa* varies with its experience; and its experience varies with the environment. The greater the variety of experience to which it is accustomed, the more readily it may be approached without producing the physical reactions which are a correlate to the physical state of fear in the higher animals, and the more readily it is tamed."

L. DONCASTER. *Heredity in the Light of Recent Research.* (Cambridge Manuals of Science and Literature.) New York: G. P. Putnam's Sons, 1911. 40 cents net.

In ten brief chapters, which, together with a glossary, list of books and index, cover only 143 pages, the author has set himself the difficult task of a simple and well-balanced presentation of a complex and imperfectly-known topic. The style is lucid, the field is well covered, and the different aspects of the problem carefully pointed out. At some points it seems a little complex for the elementary student. Possibly this is unavoidable in so complex a field and so brief a text.

F. P. GRAVES. *Great Educators of Three Centuries*. New York: The Macmillan Company, 1912. Pp. x, 289.

Fourteen essays treating in chronological sequence the principal educational movements of modern times and the men who stood sponsors for them. The book is well adapted to reading-circle purposes; this means, not that it is superficial, but that it is very clearly written and carefully organized.

MAXIMILIAN P. E. GROSZMANN. *Some Fundamental Verities in Education*. Boston: Badger, 1911. Pp. xix, 118. \$1.00 net.

This little book comes highly recommended with a four-fold introduction by Frederick E. Bolton, W. G. Chambers, A. B. Poland, and H. H. Horne, and makes a plea for manual culture and sense training on the one hand and art culture and art expression on the other. There are several illustrations of children's drawings, and of modeling in clay.

FLORENCE HOLBROOK. *Cave, Mound and Lake Dwellers and Other Primitive People*. New York: D. C. Heath & Co., 1911. Pp. vii, 130. 40 cents.

This excellent little book gives in clear, attractive style, well adapted to young people, the essential features of what we know about primitive man. The book is profusely illustrated.

PAUL R. JENKS. *A Manual of Latin Word Formation for Secondary Schools*. New York: D. C. Heath & Co., 1911. Pp. v, 81.

A systematic presentation of the different affixes which enter into the formation of Latin words, illustrated with copious examples drawn from the texts usually read in the high school. The exact location of each example is indicated.

WILLIAM McDUGALL. *Body and Mind*. New York: The Macmillan Company, 1911. Pp. 379.

A comprehensive discussion of the relation between body and mind, and a defense of animism. Review to follow.

WILHELM OSTWALD. *Monistische Sonntagspredigten*. Leipzig: Akademische Verlagsgesellschaft, 1911. Pp. 208. M. 1.

These little sermons by a great scientist give a good picture of the attitude taken by an increasing number of scientific men toward religious questions. Among the titles are "How did evil come into the world?" "Religion and Science"; "What is truth?" "Immortality"; "The Evolution of God"; "Prayer."

A. PABST. *Moderne Erziehungsfragen*. Leipzig: A. W. Zickfeldt, 1911. Pp. 206. M. 3.40. Geb. M. 4.00.

A series of papers on manual and industrial education, originally published in various periodicals, and here collected in book form. The book contains a large number of illustrations drawn chiefly from American sources, and the articles call attention to many points in English and American school procedure from which Germans might profit.

A. C. PERRY, JR. *The Status of the Teacher*. Riverside Educational Monographs. Boston: Houghton-Mifflin Co., 1912. Pp. 78. 35 cents.

An analysis of the ethical and legal bases of the teacher's authority and responsibility. Dr. Perry has rendered a valuable service in preparing this monograph. Teachers could not find a more important lesson in "civics" to pass on to their pupils than the distinction between the citizen as "subject" and the citizen as "sovereign," which Dr. Perry treats admirably in two brief paragraphs (pp. 8-9).

EDWIN S. RICHARDS. *Primary Speller*. New York: D. C. Heath & Co., 1911. Pp. iv, 124.

It is very doubtful whether the practices recommended in this book, such as teaching stems in the first grade and blend drills in the second grade, are psychologically justifiable.

GEOFFREY SMITH. *Primitive Animals*. Cambridge: University Press, 1911. (Cambridge Manuals of Science and Literature.) Pp. vi, 156. \$0.40 net.

A typical representative of this excellent series of manuals. The book is written chiefly from the point of view of the comparative morphologist, with side-lights from embryology and paleontology. After brief discussions of the animal kingdom as a whole and of the origin of life, successive chapters are devoted to the Appendicular Phylum; Embryonic and Larval Histories; the Ancestry of the Vertebrates; the Origin of the Land Vertebrates; the Rise of the Mammalia, and the Future of Animal Life. In the last chapter the author touches briefly upon the differences between social and physical heredity, recognizing that progress in civilization has depended "far more upon a continuity in tradition than upon anything analogous to the process of organic evolution"; but maintaining that evolutionary factors play a part even here, for man, by "consciously creating his own environment, which we call civilization, sets a standard by which certain types are selected for survival and others are eradicated." In this connection he indorses the general principles advanced by the Eugenists.

WILLIAM STERN. *Die Differentielle Psychologie in ihren methodischen Grundlagen*. Leipzig: Barth, 1911. Pp. 503. Mk. 11, geb. Mk. 12.

This ambitious and instructive book is put forth by the author in lieu of a second edition of his *Psychologie der individuellen Differenzen*, which appeared eleven years ago. The treatment in the earlier work was primarily a sketch of a tentative program, but so remarkable has been the progress during the last decade that the present volume is not programmatic in purpose, but rather a formulation of the basal principles of individual psychology, considered as a special scientific discipline. To be reviewed.

CLARA HARRISON TOWN, PH.D. *Congenital Asphasia*. Reprinted from the Psychological Clinic, 5: November, 1911. Pp. 167-179.

Though congenital cases of asphasia were noticed and reported as early as asphasia itself, few of them have been utilized as studies. Miss Town cites the few cases in the literature, and describes two under observation at Lincoln, Ill.

JOSEPH KING VAN DENBURG, PH.D. *Causes of the Elimination of Students in Public Secondary Schools of New York City*. New York: Teachers College, Columbia University, 1911. Pp. iv, 206. \$1.50.

A very important intensive study of the question, "Why do pupils leave the high school?"

JOHN H. WALSH. *An Introductory Algebra*. New York: D. C. Heath & Co., 1911. Pp. ix, 214.

The object of this book is to furnish pupils who drop out of school at the end of their first year in the high school with such a knowledge of algebra as will be of use to them in the practical problems of life. The doubt may be hazarded whether the energy expended in learning the new vocabulary of literal equations might not be put to better use in a study of commercial and industrial arithmetic.

TH. ZIEHEN. *Das Verhältniss der Herbart'schen Psychologie zur physiologischexperimentellen Psychologie*. Second edition, enlarged. Berlin: Reuther & Reichard, 1911. Pp. iv, 88. M. 1.80.

This monograph was originally written at a time when German educational psychology was almost wholly Herbartian, and in it the author set forth the reasons why the Herbartian point of view was certain to be superseded by the experimental. That prophecy has now been realized, but the monograph is still valuable, particularly in its revised form, on account of the admirable way in which it sets forth an important transition movement in the progress of educational thought.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

PROBLEMS AND METHODS OF INVESTIGATION IN HANDWRITING.

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In an experimental investigation of the handwriting of school children, it was found that the speed and the quality of the writing do not always vary together. That is, if one compares the lower and the upper grades with each other, the writing in one of the upper grades is in some cases more rapid than the writing of a lower grade, but of poorer quality. Or, on the other hand, the quality may be better in the higher grade, but the speed less. In order to interpret this fact it is of course necessary to know the method which was used in the two cases, and, in particular, the relative emphasis which was laid on the characteristics of speed and of form, but this illustration will serve to raise one of the most important problems in connection with the teaching of writing, namely, the problem of the relation between speed and quality in writing.

We may investigate the relation between speed and quality in a preliminary way by comparing the different individuals of a class in regard to these two characteristics. This will show whether or not a fast writer is also likely to be a good writer, or vice versa, or whether there is no constant relation between the two characteristics. In order to determine the answer to this question in a rough way, we may grade the children of a class on the basis of the speed and the quality of their writing, separately. We may then pick out the ten fastest writers of the class and place them in one group, and

place the ten slowest writers in another group. We may then compare these two groups—the fast writers and the slow writers—on the basis of the quality of their writing. That is, we may average the quality of the writing of each group and determine whether there is a marked difference between the two; or we may pick out the ten best writers and the ten poorest writers from the point of view of quality, and see to what extent, if at all, they correspond to the ten fastest and the ten slowest. This is merely a rough method of determining whether or not there is a relationship between the two characteristics.

We may now carry the investigation a step farther by asking the more significant question as to the effect upon quality of an emphasis upon the speed of writing, or of the effect upon speed of an emphasis upon quality. Suppose, for example, we have the same children write some similiar material in three ways. We will first instruct them to write the material without any special emphasis upon either speed or form. The next time we instruct them to write rapidly and note the effect which this instruction has upon the speed of the writing. If there is a marked increase in speed, we may determine how far this affects the quality, either favorably or unfavorably. In the third place, we may instruct the children to write as well as they can, and again see what effect our instruction has upon the quality of their writing and how this is related to speed. The main question is this: when the child writes rapidly, does he do so at the sacrifice of form; or, to put the question in another way, how far can he increase his ordinary speed of writing without sacrificing form? In order that the results may not be confused by irrelevant factors, we must be careful to have the other conditions in the different parts of the experiment constant. The means of securing such uniformity will be discussed in the later part of the article.

If now we should find that the increase in speed beyond a certain point causes a decrease in the quality of the writing, we have still the further question whether or not a course of training in which the speed is emphasized may be given, which will result in an increase in speed without a sacrifice of form.

Or, on the other hand, we may inquire what the effect of an extended course of training upon particular features of form will have upon these elements of form, and upon the speed of writing. For the study of this problem the writing lesson should be so conducted as to emphasize clearly one or the other of the two characteristics, and then the results should be measured in terms of both speed and form. Suppose, for example, the writing instruction for several months in a given grade were directed toward improvement in speed, for the main part. Attention should be given in this form of training to the use of rhythm in maintaining an increasing speed. If, at the end of the period of training, we have succeeded in materially increasing the speed of writing, we may then determine whether or not there has been any equivalent change in quality.

In directing attention to the quality of writing, through a similar course of training, it is well to lay particular emphasis upon certain features of form in order to determine to what extent there is a modification of these particular elements. That is, it will be useful not merely to direct attention to form in general, but to concentrate attention upon certain elements of form—such, for example, as the uniformity of slant or the uniformity of the alignment of the top and bottom of the letters. Or, we may select certain letters and attempt to bring about improvement in them. In this way a comparison may be made between the amount of improvement which is brought about in the different letters, in order to determine whether some are more difficult to form than others. After the training upon certain letters it would be well to secure an answer to two questions. First, how far have these particular letters been improved, and second, has there been any transfer of improvement to other letters? For this the teacher is left to make her own analysis of the letters and to fix her own standard of comparison. She should keep the writing of the children before and after the courses of training in order to compare the samples written by the same child at the two times. In this way she will be able to determine not merely whether an improvement does or does not take place on the average, but may also determine

in what respect the writing of the individual child changes under a given sort of treatment. From this detailed examination and analysis of the writing of the individual children, some general conclusions may then be drawn by averaging the results of the individual children. When it has been determined how much progress has been made in quality, this may be compared with the change in speed which has taken place during the same period. Thus the effect upon speed of a definite kind and amount of improvement in quality may be measured.

These are some of the problems which may be investigated by the grade teacher in her ordinary conduct of writing instruction. There are some broader problems which require a somewhat more extended control of writing instruction, and which are therefore appropriate for supervisors, principals, or superintendents, or for such investigators as may have access to large groups of children. A very general problem which has an important bearing upon the pedagogy of writing concerns the way in which writing develops at different ages. We may take again our two characteristics, speed and form, and determine how they change from grade to grade, or from one age to another. We may examine both speed and form separately and then work out their relation to one another. Take speed, for example. Is it true, as is assumed by certain systems of teaching penmanship, that the child in the first grade is capable of practically the same speed as the child in the eighth grade? Are there certain times when there is a marked increase in the capacity for rapid writing, and if so, when do these transitional times come? Our general knowledge of the child's development indicates that we should find a marked development of the co-ordination at about the ninth or tenth year. If this is the case, can we find traces of it in the writing of the child at this time?

The same question may be put in relation to form. We may investigate here not merely the improvement in form in the early years, but also the check in improvement or the actual disintegration which is apt to appear in the upper grades or in the high school. Is this due merely to the fact

that writing drill is relaxed, or is there some deeper reason? Is there at these later years a marked increase in speed which might perhaps account for the check in development of form?

In order to determine the answer to these questions we should grade the writing of children at the various ages in speed and quality, and determine the average and the amount of variation for the different ages. It is important to include the degree of variation within the different groups as well as merely the average.

This question of the development of form and speed is, of course, complicated by the results of different forms of training. It is possible that one form of training might produce a higher degree of speed in the early years than another form, and this greater speed might or might not be accompanied by a sacrifice of form. A specific question which arises here is, what is the consequence of teaching rapid writing movement in the first two or three grades, or of allowing the child during these early years to use a slower drawing movement, while his attention is concentrated upon form. There are two distinct positions taken in regard to this question. Some writing systems give the same sort of movement and speed drill in the very earliest years, which are given in the later years, while others attempt to adapt the form of teaching to the development of the child in motor capacity. It would seem to be more in accord with our knowledge of the child's development to allow him to attack the problem of form in the first two or three years, and to defer the development of a rapid and smoothly co-ordination movement until the intermediate grades, but this question can not be decided merely by inference from our general knowledge. It should be investigated and decided by comparing the results of the two forms of procedure. This might perhaps be done by merely selecting two school systems in which the contrasted forms of training are given. We would then examine the writing of the fifth or sixth grade children, who had begun their rapid movement drill in the first grade, with those who had not been given such drill until the third or fourth grade. We would be still somewhat uncertain, however, because of the fact that there might be other differences of method which

would account for the difference in result. It would therefore be more conclusive to direct the training of two similar schools in such a way that the only difference in the method would be this one in the time of beginning rapid movement drill. Such investigation would of course require several years for its prosecution, but it would have the advantage of definitely settling a mooted question.

Other differences in method might also be investigated. For this purpose, according to the fundamental principle of experimentation, we should keep all other conditions, except the one which we are studying, as nearly alike as possible among the different groups under investigation. For example, if we were taking up the question of the relative advantages of the arm movement and of the combined arm and finger movement, we should see to it that two groups of children are taught exactly alike, except that one was given the exclusive arm movement and the other the combined movement. It is generally conceded that the introduction of the arm movement marked a great advance in the teaching of penmanship, but it is a question whether the advocates of this system have not perhaps gone to an extreme in attempting to exclude all finger movement. This question might be pretty well determined in the course of a year's training of two groups of children of the same age. In order to be able to say how far the two groups of children actually use finger movement both at the beginning and at the end of the experiment, it would be well to secure specimens of their writing with hand tracer constructed by Professor Judd.¹

A still more radical difference in method could be investigated by the comparison of the results of a year's teaching with one group of children in which the movement drill aspect of writing was emphasized, with the results of a similar period of training of another group in which the analysis of the form of the writing was the chief feature of the method. It would be well to note what the effect of these two contrasted methods is upon both the form and the speed of the writing.

In a similar manner any question in method which is of any

¹This instrument is described on page 120 of Judd, *Genetic Psychology for Teachers*, and may be obtained at cost by addressing the writer at the University of Chicago.

movement in the pedagogy of writing may be investigated. For example, the effect of posture at the desk, or of the form of the desk itself may be studied. Why should we write upon a level desk? Would it not be a much more natural position, and one which would in large measure overcome the tendency to stoop, to tilt the desk toward the writer at an angle of 30 or 45 degrees? A trial will convince the reader that this is of immense advantage from the point of view of seeing the writing. Another question concerns the most advantageous amount and distribution of time of the writing lessons in the various grades. For example, is fifteen minutes given to writing every day better or worse than thirty minutes every other day? The question must be settled separately for the lower and the upper grades. Finally what is the best method of teaching writing in the upper grades after the writing habit has been fairly well established? Would it perhaps not be better to grade the general written work partly on the basis of penmanship and thus encourage careful writing in all the work rather than to have specific writing instruction? Still other questions which merit investigation will doubtless occur to the experienced teacher.

In this outline of some of the problems to be investigated, we have assumed that we have command of a method of determining the speed and the quality or form of writing. In order to insure uniformity in the grading of these two characteristics, it is necessary to point out the details of method by which such grading should be made. The measurement of speed is the simpler of the two. This may be made in two ways: first, by finding how long it takes the child to write a certain amount, and second, by finding how much is written in a certain time. The second is the more feasible method when a group of children are to be investigated at the same time. The following form of procedure is recommended. First, in regard to the matter which is to be written. Since our aim is to measure merely the speed of writing and not the speed of the thought process, the writing should not be interrupted by the necessity for reflection. That is, the child should memorize thoroughly what he is to write so that he may write continuously. Again, when a test given at one

time is to be compared with a test given at another time, the material should be as similar as possible in the two tests, though not identical. For this purpose it would be well to select a poem of uniform character and require the child to memorize it at the beginning of the experiment. One stanza should then be used at the first test and the second stanza at the second test, etc. If the child finishes the stanza within the specified period he should begin it again and so continue until the end of the period. At the end of the experiment it would be well to have the child write all of the stanzas at one time in order to find out whether they are of equal difficulty or not.

A five minute period will be found of convenient length for a test. The children should have their paper and pens ready to write at the signal from the teacher. They should then write continuously until the signal to stop is given. Either after or before the test each child should write his name, age and grade upon the paper.

The manner of giving instruction for the test is important. It has been found, for example, that the result will vary greatly according as the child thinks that the speed of his writing or the quality is being tested. If, now, we are endeavoring to secure his ordinary average writing we must be careful to avoid giving the impression that we are testing particularly either speed or form. For this purpose some such instruction as the following might be used. Without telling the child at all that he is undergoing a test, one may say: "I want you to write the first stanza of the poem which you have learned. Write it just as you would in a composition or an ordinary school exercise. If you finish before the end of the time begin and write it over again. Begin to write when I say 'Now' and stop when I say 'Stop'." It would be well to carry on a preliminary experiment in order to be sure that the children understand the instructions.

The measurement of the quality or the form of writing is more difficult. In the first place there is no universal agreement as to what is meant by good or bad writing. One may refer to legibility, or beauty, or character, or the approximation to a particular standard which is held to represent per-

fection of form. One might also analyze form into such characteristics as regularity of slope, regularity of alignment or spacing, or one might distinguish between different sorts or degrees of deviation from a standard form of letters according as the deviations were or were not prejudicial to the legibility of the writing. It would clearly be more illuminating if we should grade writing on the basis of these definite characteristics rather than upon the basis of the indefinite characteristic of quality. Some method of grading writing based upon the analysis of its quality into its elements must ultimately be worked out. For the purpose of the investigations which are here described, however, we may use the method of grading legibility which has been developed by the Division of Education of the Russell Sage Foundation under the direction of Leonard P. Ayres.² This method has the advantages of having been worked out in a purely objective way, and of being entirely unambiguous as to the meaning of the scale which has been produced. Differences in the scale represent differences in the ease with which the respective samples may be read. The legibility of any specimen of handwriting is to be determined, then, by deciding what sample in the scale can be read with equal ease. This procedure does not get rid of all the difficulties incident to such a judgment, but it at least furnishes an unambiguous criterion. To render the comparison easier, the scale is composed of three parallel sets of samples, made up of three styles of writing, distinguished according to the slant. Thus any sample may be compared with the

²Descriptions and copies of the scale may be obtained by addressing Dr. Leonard P. Ayres, Russell Sage Foundation, 400 Metropolitan Tower, New York, at the price of 5 cents each. The first effort to construct a scale for measuring handwriting was made by E. L. Thorndike. See *Teachers' College Record* for March, 1910. The difficulty with this scale for practical use is the ambiguity as to what constitutes excellence. The judges upon whose verdicts the construction of the scale was based were asked to consider the three qualities legibility, beauty and character. Obviously different judges may put different degrees of emphasis on these three qualities, and as a result rate a particular sample differently. A second method has been reported by D. Starch at the meeting of the American Psychological Association in December, 1911. This method consists in measuring the variability in slant and alignment of ten letters chosen from each sample. This method is more cumbersome than that of Ayres, and does not analyze the writing sufficiently to give it a distinct advantage on that score. The writer has, as a result of these considerations, chosen the Ayres method as the one to recommend for use in a practical survey of the quality of writing.

style in the scale which most nearly resembles it. This scale has the further practical advantage that it is gotten out by a central agency of educational research. It can, as a result, come easily into general use as a means for conducting surveys of handwriting, and thus serve to bring together a great deal of comparable material.

It should be said, however, that this method of grading, if used alone, is exceeding deficient. In order to obtain anything which approaches a useful measure of writing, the speed must be taken into account as well as the legibility. It will still be necessary, before we have solved all the problems which are involved in the teaching of handwriting, to carry on investigations which shall consist in an analysis of the form of the writing and of the movement and mental process by which it is produced, but for the purpose of survey and of statistical investigation this method of appraising the result rather than of analyzing the process is convenient.

The purpose of this article has been to lay out a typical set of problems and to indicate how the teacher or the supervisor of penmanship may contribute to the solution of these questions by collecting results which can be stated in a quantitative way, and which can be compared with results found by other investigators. It is by such investigation that questions regarding the relative merit of different methods of teaching may be placed upon a solid basis of fact, instead of upon theoretical inference.

NEEDED RESEARCH IN METHOD.¹

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The field of method, like that of the *principles of education* and of *educational psychology*, is not clearly defined. What should be the basis of method is still an open question. Is it to be found in a unique psychology of the learning process or is it to be determined by the logic of subject-matter? Or, again, as Doctor Snedden suggested some three years ago, is it to be sought in a compromise between the two? (*Educational Review*, Vol. 35, pp. 237-238). These questions are subtle, may be too subtle to be answered; and yet method cannot win a distinct and worthy place in educational thought unless they are solved. A brief critical survey of the literature of the subject may offer some suggestions.

Books on method may be roughly divided into four classes. The first, and by far the largest class, consists of those works which, either in fact or in name, deal with *general method*. These treatises often discuss the broader problems of education, such as the aim and organization of schools; but the great body of them emphasize the psychology of the learning process. To all intents and purposes, they are psychologies, or at least partial ones, with illustrations from educational procedure. The second class is made up of those works which give a brief summary of the principles underlying the teaching process and then apply them to all or most of the studies in a given curriculum. The third class is constituted of works on *special method*, which usually go by such titles as *Special Method in History*, *The Teaching of English*, *The Teaching of Mathematics*, etc. The fourth class is coming from the psychological laboratory and consists of experimental studies of such topics as the *Psychology and Pedagogy of Reading*,

¹Read at the Wellesley meeting of the New England Association of College Teachers of Education, December 2, 1911.

The Psychology and Pedagogy of Writing, The Psychology of Skill, and the like.

The fundamental idea underlying the works in the first class is that a teacher who knows general psychology can be trusted to apply it in all specific situations arising in the classroom. This idea was clearly formulated by Comenius in *The Great Didactic*, was worked out by Herbart and his followers, and still is one of the most popular points of view in method to-day. For example, Dewey states exactly this thought when he says, "The teacher who is an intelligent student both of individual mental operations and the effects of school conditions upon those operations, can largely be trusted to develop for himself methods of instruction in their narrow and more technical sense—those best adapted to achieve results in particular subjects, such as reading, geography, or algebra." (*How We Think*, p. 46). Bagley, in the preface to *The Educative Process*, points out that his work "covers the field commonly included under the terms, 'General Method,' 'Method of the Recitation,' 'Theory and Practice,' etc.; but it deals with principles rather than with the details of device and 'method'." The writer, so he goes on to say, "is convinced that clear and definite notions of the functions of education and of the laws which govern the educative process will do much toward eliminating the waste of time and energy that is involved in the work of the school." In a word, the faith of *general method* is that there are general principles which can be widely applied in school practice. If a teacher know these, he can make whatever little modification a given situation may demand.

In spite of the fact that there is a most important truth in this position, nevertheless, there are two quite serious weaknesses. In the first place, general principles do not play the part in practice that some think they do. It may take a good general chemist a long time to become a good agricultural chemist. It may take a good general psychologist, or even a good student of education, a long time to become a good teacher. The ideal candidate for a position as railroad engineer is the man who knows general physics, the physics of the railroad engine, and who has the skill from experience to handle the engine. So with the teacher. The ideal teacher

is the one who knows the functions of education, the laws of the educative process in general, the laws of the educative process as manifested in the particular subject taught, and who has besides the skill that comes from teaching. *General method* has ignored or underestimated the fact that general psychology is quite a different thing from the psychology of a given subject of instruction. Induction in history and induction in physics are both induction to be sure, but they are so only in the rough. In the fine, they are very different processes. The second weakness lies in the fact that, in spite of their warnings against it, writers of general method have given us adult psychology rather than child psychology. Things apperceived by a mature mind may not be apperceived by a child's mind. In theory, this last statement is a platitude; but in the schoolroom it is one of the most difficult problems a teacher ever faces. If any one wishes to test these two weaknesses, let him prepare some lessons, say inductive ones, and try them out on a sixth grade class.

Ignoring the second class of books and passing to the *special method* group, we meet with writers who put the emphasis upon the subject-matter taught rather than upon the methods in their stricter sense. Many of these books are excellent and most helpful to the teacher; and yet they have one limitation. They put nearly the whole burden of their work upon the sources and organization of the subject-matter itself, and almost none upon the way the subject-matter organizes itself in the child's mind. This was the second weakness of the first class.

The fourth class represents an almost wholly different view. Here the emphasis is placed on the child's mind as it works through some given element of the curriculum. Men in this field believe it quite futile to talk in an *à priori* fashion about the way the mind acts. For them the significant question is: How does a given mind act in a given situation? W. F. Book's *Psychology of Skill* is an excellent example of this class. This monograph is an experimental study of habit-formation as exemplified in typewriting. Not only are the specific habits studied, but also the more general aspects of mental life connected with the learning process, such as the merging of

smaller habits into larger ones, the effect of fatigue, general health, mental inertia and "warming up," points where interest tended to flag, kinds of practice that counted most for efficiency, etc. The meaning of such work for method is at once apparent. The crucial points in a particular learning process are shown up, and the suggestions offered the teacher are vital and definite, not vague and general. In a word, the psychology deduced grows out of the operation; it is not thrust upon it.

Such work as this might well serve as a model for research work in method. All the factors involved in the case are considered: general psychology, the particular psychology of the subject taught, and the child who is being instructed. The true province of method would seem to lie right here: it is the scientific study of the child's (not the adult's) mind as it acquires a given experience involved in a given piece of subject-matter. There is no way except this to get adult faculty psychology out of method. Under such a view as this, all method becomes essentially special. General method is not ignored, it is elaborated and modified and corrected. Method then becomes a branch of educational psychology; that branch which aims to psychologize definite subject-matter from the child's view point. The logic of the subject is not ignored, nor is the child merely entertained. The effort is to determine just how much of the logic of the subject can be given to the child and just what methods are best to give it to him. One modern writer has defined method in this same manner when he says, "Essentially, a study of teaching is reflection upon the way that subject-matter grows and organizes itself. It differs from psychology in that, while psychology treats of the child in terms of the processes of experience, such as memory, imagination, etc., methods of teaching deal with the ways in which the child gets control of subject-matter. For pedagogical purposes they both deal with the same great problems and are closely interrelated, being two aspects of the same thing, but differing in the point of view from which each is studied." (*Charters' Methods of Teaching*, p. 97).

This conception of method demands that educational psy-

chology do not trail along behind general psychology, but stand on its own feet as an independent science. Within this science method would have a definite and worthy field. It would include what is now called *general method* and a great deal more. In a word, this view of method posits the fact that every subject offers a unique and valuable psychology and pedagogy. Enough has already been done to show that this position offers excellent opportunities. Meumann's *Experimental Pedagogy*, Lay's *Experimental Didactics*, Huey's *Psychology and Pedagogy of Reading*, Thompson's *Psychology and Pedagogy of Writing*, Book's *Psychology of Skill*, Cornman's *Spelling in the Elementary Schools*, Brown's *Psychology of the Simple Arithmetical Processes*—these and others like them have given most encouraging results. It is true that nearly all the work so far has been done in the habit group of studies. Gilbert's *An Experiment on Methods of Teaching Zoology* seems to be the only piece of work outside of this group. The next step will consist in the extension of the investigations already begun and the application of the same methods to the other subjects of the curriculum.

History work, for example, offers some fine problems for this kind of research. An illustration may be taken from the *Report to the American Historical Association by the Committee of Eight on The Study of History in the Elementary Schools*. In discussing the sixth grade course, the committee says that "it must be remembered that the fundamental aim is not to store the child's mind with many detailed facts of general history, but to make certain impressions which shall exercise a guiding influence over the child's intellectual growth, to furnish him with a frame work into which his later reading or study shall place what he acquires." With reference to the content of the course, the report says, "those features of ancient and mediaeval life have been illustrated which explain either important elements of our civilization or which show how the movement for discovery and colonization originated." Regarding method, the makers of the course affirm, "Pupils in this grade are not prepared to study scientific history in its logical and orderly development. But they are prepared to receive more or less definite impressions that

may be conveyed to them by means of pictures, descriptions, and illustrative stories, arranged in chronological order."

To a mature mind, this course seems almost ideal, both in its general statements and in its outline of details. But suppose it is placed in the classroom even in the hands of an excellent teacher. Will not a number of the most significant questions arise? Can a sixth grade boy or girl acquire any impressions, vague or otherwise, of the march of progress or of world movements? If so, what kind of impressions? Does chronological sequence have any meaning to a child of twelve? Will pictures, descriptions and illustrative stories remain simply pictures, descriptions and illustrative stories, or will they be symbolical of meaning? Granted that they may be the latter, how best make them so? Can a child, from a panorama of imagery, draw an emotional generalization? Or, must the teacher fall back on real scientific induction? If so, how give a student a sense of the *probable* which always goes with such generalization in history? It is apparent at once that the whole course is permeated with adult conceptions and points of view. General method and general psychology can do no more than block out the way in the rough. The teacher's *real* problem then begins: how use induction and deduction, analysis and synthesis, lecture and topic, question and textbook? Induction, for example, does not settle the problem of method: a bigger problem is, how use induction? In avowing his faith in his method by which all things were to be taught to all men, Comenius said, "Thus do the perplexities of one age afford amusement to the next." After 300 years of general method, we still find that it is not amusement to apply its principles. It is high time that we were taking another tack.

It is such problems as these that the student of method faces in the future. The expert educational psychologist alone cannot solve them. Neither can the expert empirical teacher. It will be that rare combination of two, just that combination which Münsterberg, in his *Psychology and the Teacher*, thinks impossible, since the teacher who psychologizes will be likely to lose his sympathy, and hence his art. The newer view of method maintains that it is not

sympathy for the pupil's personality that is needed, but sympathy engendered by insight and directed to a pupil in a particular critical situation. The faith of this newer view of method is that men and women will come forward who can follow appreciatively the child's mind as it works through a given piece of subject-matter and detect in this process the critical points and devise means of meeting them. If this kind of research be not done and be not recorded, then the science of teaching is a misnomer and good school work will have to await the day when there arises a generation of born teaching geniuses.

Last summer the writer spent an hour with an expert manager of a sawmill. This manager related that two years before he had installed in his plant a complex system of belt saws, and had at once met with all sorts of difficulties in setting, filing, and adjusting them. Finally, he was forced to call in a scientific machinist, who, in one day, put them in perfect order. When the machinist was leaving, the manager said to him, "I will give you five hundred dollars if you will explain to me how to fix these saws so that I may do it myself in the future." The machinist replied that he had, after ten years of experience, written a little book which explained the whole process in detail. The manager then described how he had purchased one of these books and set to work to learn the art, and how he had, after a few weeks, mastered the whole task completely. He concluded his story by saying that this little book contained absolutely every thing that was needed. Now, it may be an idle dream, but does not the science of teaching need just such books as this: books on the teaching of writing, reading, spelling, arithmetic, history, and so on? If this ideal does not appear fantastic, then does it not become the duty of students of method to give it a thorough-going testing by working with concrete facts as found in school practice? Few sciences have ever made much progress through purely dialectical methods. Hypothesis forming has been only half the work, testing has been the other half. The so-called science of teaching has an abundance of hypotheses: the other half of the work remains to be done; namely, making these hypotheses face realities.

A TENTATIVE REVISION AND EXTENSION OF THE BINET-SIMON MEASURING SCALE OF INTELLIGENCE.

PART II. SUPPLEMENTARY TESTS.—CONTINUED.

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2. THE COMPLETION TEST.

Ebbinghaus characterizes this method as a real test of intelligence, which, he says, "consists in the elaboration of a whole into its worth and meaning by means of a manysided combination, correction, and completion of numerous kindred associations." Ebbinghaus finds a correlation between this test and intelligence; Wiersma, between capacity in the completion test and native ability; Krüger and Spearman, a correlation of 97 per cent. between capacity in the completion test and the hypothetical "central factor."

One objection to this test is the difficulty in standardizing it. To be suitable for this purpose a selection must have a close logical connection from beginning to end, and the degree of mutilation must be such that the performance is not the result of pure guess work or literary imagination, nor must it be so easy as to require no effort. By experimentation on about two hundred pupils the following form was devised as one which it was hoped would bring out quantitative and qualitative differences. While we used only one text, we would suggest that for a more extended test of the child's ability in this field two or three different tests, varying in sense and degree of mutilation, might well be employed. However, the use of a mutilated text of different degrees of mutilation, such as ours, partially obviates the need of employing a series of texts. The text used was typewritten, with bars (all of same length, $\frac{3}{4}$ -inch) representing blanks. The three cross bars dividing the test form into four parts were not in the text used, but are inserted here for the convenience of the reader.

COMPLETION FORM.

One _____ the eagle met _____ the other _____ to see who
 could _____ the highest. They agreed _____ he who _____ fly
 the _____ should _____ called the strongest. All started _____
 the same _____ and flew _____ among the cl____. One by _____
 they _____ weary and re____, but _____ eagle _____ upward
 and _____ un_____ he _____ a _____ speck _____ the heavens. |
 After _____ hours, when _____ sure _____ the other
 _____ had _____ up _____ contest, he decided _____ return to
 _____. When he _____ back, _____ others _____
 for him; and _____ he touched _____, a sparrow _____ off
 _____ back, where _____ hidden, and _____ that
 _____ himself _____ strongest _____. | "I _____ stronger
 _____ the _____," said _____, "for not _____ did I _____
 _____ high, but _____ he _____ downward, I came _____
 _____ hiding _____ up _____ little _____." After
 _____ boastful _____, the birds _____ heads _____ shame,
 _____ council _____ matter. | After
 _____, they decided _____ was
 _____ for _____ only _____ he _____ high
 but _____ car _____ well.
 To _____ day _____ plumes _____
 emblems _____ str _____ cour_____.

An examination of the text will reveal the fact that there are four progressive degrees of mutilation. These parts are separated by cross bars in the above reproduction. The first part is mutilated to the extent of 33⅓%; the second 45%; the third, 54%; the fourth, 66⅔%. There are several advantages in the use of a graduated mutilation test instead of one of uniform difficulty, just as is the case in any other serial scale. It is equally available for children of several different ages and different degrees of ability. It also tends to prevent scattering of effort in spots over the entire paper. In nearly all cases the children filled in the blanks consecutively, with now and then an omission, so far as they were able in the time given. They got their bearings where the mutilation was slight, and this served to round out their later associations into a logical whole, even though the degree of mutilation was great.

Source of Material.—This test was given to all the pupils in the Palo Alto schools from the fourth to the eighth grades, inclusive. The method was as follows: E explained to the

class that the test to be set before them would be a story from which many words would be found omitted. They were directed to insert only *one* word in every blank space, or, where necessary, complete an unfinished word, and were asked to have, so far as possible, a well connected story when the filling in had been completed. The test papers were then distributed face down, and at a signal from E the papers were turned and work begun. At the end of fifteen minutes, work stopped and the papers were collected.

Scoring.—The usual method of marking such tests, by allowing the same credit for each word correctly inserted, would of course, not be reasonable in this test where the difficulty is not uniform. After the preliminary experimentation with the first graded completion test, the writers decided that to allow credit for each word correctly inserted in proportion to the degree of difficulty of the section in which it came would serve to bring out most clearly characteristic individual differences. The following method was therefore adopted. Each blank in Section I was credited 6 when correctly filled; Section II, 8; Section III, 10; Section IV, 13. The total score for a perfect performance would be 100.2, or approximately 100. One-half of the above credit was given where the words inserted made a well connected story, but were related only in a moderate degree to the thought that should have been given by the printed words. No credit was given for inserted words which did not make sense in their setting, or for words forming a connected story which was purely literary invention, having no connection with the thought given by the printed words. While individual words had to be frequently considered, yet on the whole the inserted words made sense, or the contrary, by series of words or by phrases. Credit was then given to the individual words in proportion as the phrase in which they were placed made sense in its entirety. Thought was considered rather than elegance of diction.

Results.—Table VII summarizes the results by years. It should be noted that the table shows for each year the grade reached or surpassed by two-thirds of those tested at that year, as well as median performances by years. Two samples of widely differing performance are also inserted.

TABLE VII.
COMPLETION TEST.—SUMMARY.

Age.	Number Tested.	Median Mark.	P. E.	Two-thirds Pass.
9	32	18.4 <i>2</i>	8.5	14.9
10	39	29.2	11.8	20.4
11	52	32.2	11.1	25.2
12	56	34.2	11.7	25.6
13	57	45.9	15.2	36.6
14	33	48.5	9.4	42.8

*Sample of an excellent performance by a fourteen-year-old S.
Grade 100.*

One [day] the eagle met [with] the other [birds] to see who could [fly] the highest. They agreed [that] he who [could] fly the [highest] should [be] called the strongest. All started [at] the same [time] and flew [up] among the cl[ouds]. One by [one] they [grew] weary and re[turned], but the eagle [flew] upward and [upward] un[til] he [became] a [tiny] speck [in] the heavens. | After [two] hours, when [he was] sure [that] the other [birds] had [given] up [the] contest, he decided [to] return to [the earth]. When he [came] back, [the] others [were waiting] for him; and [as] he touched [the ground] a sparrow [flew] off [his] back, where [it had been] hidden, and [said] that [he] himself [was the] strongest [bird]. | “I [am] stronger [than] the [eagle].” said [the sparrow]. “for not [only] did I [fly as] high, but [when] he [flew on] downward, I came [from my] hiding [place and flew] up [a] little [way].” After [this] boastful [story] the birds [dropped their] heads [with] shame, [and they held] council [to decide the] matter. | After [having the council] they decided [that the eagle] was [the stronger bird], for [not] only [did] he [fly so] high, but [he] car[ried the sparrow as] well.

To [this] day [his] plumes [are worn as the] emblems [of] str[ength and] cour[age].

Sample of poor result and badly scattered effort by a twelve-year-old S., who tested much below normal.

Grade 17.9.

One [day] the eagle met [crane] the other [was] to see who could [be] the highest. They agreed [that] he who [could] fly the [other] should [not] called the strongest. All started [at] the same [time] and flew [through] among the cl—. One by [one] they [went] weary and re[ach], but [the] eagle [went] upward and [crane] un[der] he [touch] a [little] speck [of] the heavens. | After [the] hours, when [the others] sure [and] the other [who] had [goi]n up [to] contest, he decided [he] return to [back again]. When he [fell] back, [the] others [ran up] for him; and [when] he touched [the ground] a sparrow [fell] off [his] back, where [he was liei]ng hidden, and [hid] that [he] himself [was not] strongest [all]. | “I [though] stronger [than] the [others],” said [the stranger], “for

not [as] did I [but to] high, but [when saw me] downward, I came [up from] hiding [and he look] up [and] little [while]." After [while] boastful [were] the birds [with great] heads ——— shame, [to join great] council [in the was] matter. After [while when they] they decided [about where there] was [a] ——— for ——— only ——— he ——— high but ——— car ——— well.

To ——— day ——— plumes ——— ——— ——— ———
 emblems ——— str ——— cour ———.

The results show clear differences in performance from year to year, except in the 12th year, which showed hardly any gain over the 11th. This test, therefore, fulfills the most important requirement for use in a measuring scale of mentality. We believe that it brings to light fundamental differences in the thought processes, and affording as it does a more extended performance than most of the short Binet tests, it seems to us of corresponding greater value than most of the latter. For clinical purposes, however, it will have to be determined how and to what extent an S's performance is influenced by taking the test with a group instead of individually.

3. BALL AND FIELD TEST OF PRACTICAL JUDGMENT.

Another test introduced for a try-out was the following: E draws a circle about three inches in diameter on a sheet of paper, leaving a small gap which is called a gate. S is then told that this circle represents a round field, that in this field a base-ball has been lost, that we have no idea what part of the field the ball is in, only we know that it is somewhere in the field. S is then asked to take a pencil and mark out a path showing what direction he would walk in hunting the ball. To make clearer what is wanted, E takes the pencil and marks the path as far as the gate, then gives the pencil to S. Before S begins, however, he is further informed that the field is covered with grass about six inches high, so that the ground cannot be seen clearly farther than ten feet on each side of him. E then adds "What direction will you go so as to be sure not to miss the ball?"

An examination of the results showed that four grades of performance could very readily be distinguished. The younger children gave no evidence of any rational plan of procedure, further than to fill up the entire field with marks. Their lines

were not parallel, were frequently crossed and re-crossed, and often were broken. By "broken" it is meant that the pencil was lifted and set down again at another part of the field. This general absence of plan was scored 1. Somewhat older children showed, as a rule, some degree of plan. If the lines were partly but not entirely parallel, only very slightly broken and seldom crossed, or if there was some other poorly adopted procedure, such as lines radiating from the center like spokes, the score 2 was given. If the lines were almost perfectly parallel (whether spiral or straight), not at all crossed or broken, the score was 3. Score 4 was given when in addition to the performance for score 3, S showed that he had taken into consideration the fact that the ground was visible only 10 feet on either side of him, and that the lines could be 20 feet apart, except around the border where the path had to approach within 10 feet of the fence. It was easy to ascertain by a question or two whether this had been taken into account. Figure III gives reproductions of typical reactions to this test.

The ball and field test was not introduced until more than half the tests had been completed. In all, 113 children were given this problem, with the results shown in the following table.

TABLE VIII.

Age.	Number of Cases.	Score.			
		1	2	3	4
4	2	2	0	0	0
5	3	3	0	0	0
6	3	3	0	0	0
7	4	2	2	0	0
8	11	1	7	3	0
9	26	3	11	12	0
10	17	1	3	13	0
11	21	2	3	16	0
12	17	1	5	10	1
13	5	0	1	3	1
14	4	0	0	2	2

Score 2 may, therefore, be set provisionally as a standard performance for the eighth year, score 3 for the tenth year, and score 4 somewhere above the thirteenth year.

On the whole this is a test which seems worthy of a much more thorough trial than it has had in our series. It is easily and quickly given, attracts the interest of the S, and gives a performance which lends itself to standardization. A

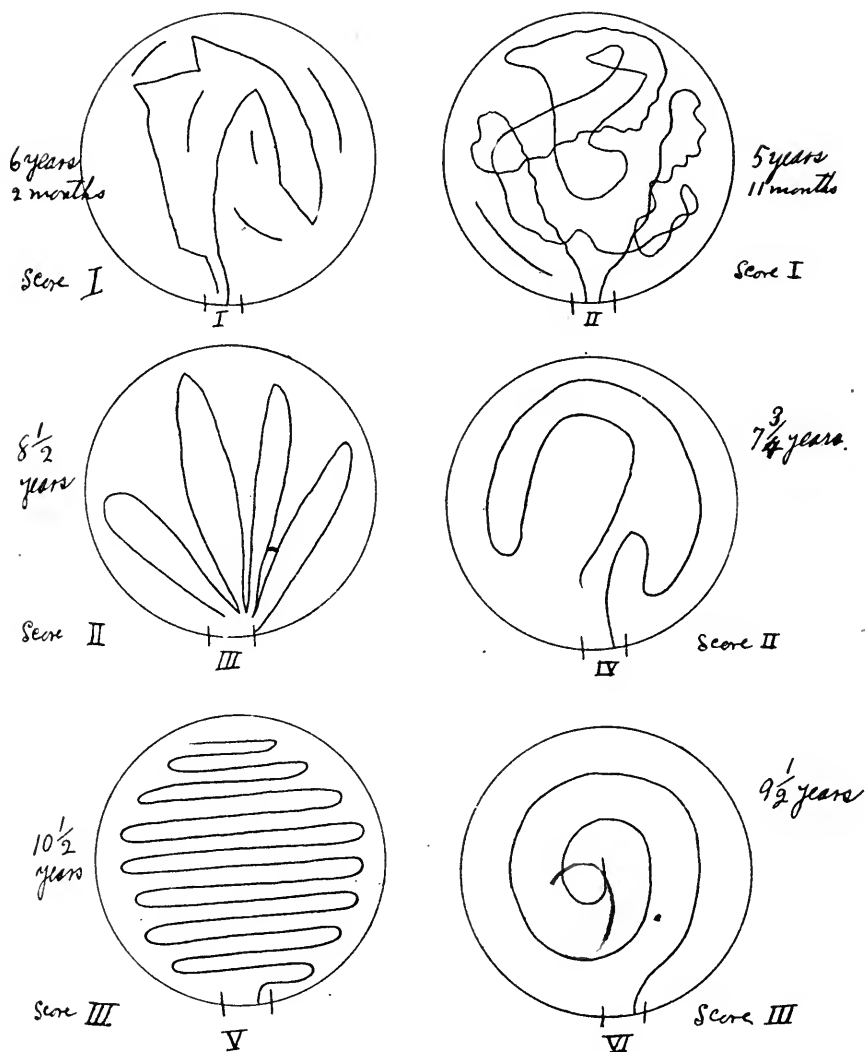


FIGURE III.



few tests of this general type are much needed to round out the Binet scale, but unfortunately unobjectionable tests of this kind are hard to devise. The problem set may be too easy or too difficult, it may permit of a mechanical solution, or it may give too large a play to the element of chance and thus approximate the puzzle. The ball and field test meets these requirements and offers striking development in performance with increasing age. For example, plans II, IV and VI of the illustrations above reproduced are the performances of three sisters, aged 5-11, 7-9 and 9-6, respectively.

A somewhat more difficult form of this same test is now being used with older children and adults.

4. THE VOCABULARY TEST.

The experiments of Kirkpatrick and Whipple show that it is possible to ascertain with serviceable accuracy the size of an individual's vocabulary by means of a test of 100 words properly selected. Considering the facility with which such a test may be applied, the relative ease of establishing age norms, and the suggestiveness for clinical purposes of the quality as well as the quantity of definitions given, it would seem that some kind of vocabulary test ought to be devised for use in each year. Its application requires only from five to fifteen minutes, and its results are much more significant than the scattering definition tests used by Binet in years 6, 9 and 13 of his scale. If the vocabulary test is given, the Binet definition tests may be omitted.

It has seemed to the writers that a vocabulary test to be used upon children and as a part of a measuring scale of intelligence should be based in so far as possible upon the mass of familiar words employed as the vehicles of the most common and therefore presumably the most fundamental concepts in general use. The more it is desired to measure intelligence rather than the effects of training, the more necessary it becomes to make the selection from a representative list of fundamental terms instead of from a complete list of language units. The more complete the list from which the selection is made, the more it tends to reveal accidents of training rather than real intelligence. For our present purpose, therefore, the complete or un-

abridged dictionary is not to be considered. Kirkpatrick's test is based upon Webster's Abridged Dictionary, containing 28,000 words. Even this has a very large proportion of words the interpretation of which depends upon the technical training, as is indicated by the fact that Kirkpatrick's test gives even for college students an average vocabulary index of only about 70%. In other words, more than one-fourth of the words are so technical that highly selected young men and women of this extended academic training can not define them. Casting about for a fairer test of intelligence the writers, after some preliminary trials, have arranged a list of 100 words selected from Laird and Lee's Vest-Pocket Webster Dictionary, 1904 edition. This dictionary meets the above specified requirements more nearly perhaps than any other, containing as it does about 18,000¹ of the most basic words of the language. Taking the last word of every sixth column gave the following representative list of 100 words used in our test:

VOCABULARY TEST.

afloat	frustrate	philanthropy	achromatic
apish	gelatinous	plumbing	amberggris
artless	gown	pork	cameo
avarice	guitar	priceless	casuistry
haste	harpy	promontory	complot
bewail	herd	puddle	declivity
bonfire	hysterics	quake	exaltation
brunette	impolite	ramble	fen
charter	insure	reception	hookah
civilly	irony	regard	incrustation
coinage	juggler	reposing	infuse
conscientious	lecturer	roarer	laity
copper	lotus	rule	limpet
crunch	majesty	scorch	ocher
curse	Mars	shrewd	paleology
depredation	mellow	skill	pärterre
dilapidated	milksoap	snip	perfunctory
disproportionate	misuse	southern	piscatorial
drabble	mosaic	sportive	precipitancy
easterly	nutzzle	stave	retroactive
embody	nerve	straw	sapient
envelope	noticeable	swaddle	selectman
eye-lash	orange	tap	shagreen
flaunt	outward	tolerate	sudorific
forfeit	peculiarity	treasury	theosophy

¹The publishers incorrectly state the number as 30,000.

As already stated, all the vocabulary tests were given individually. The child looked at the word, heard it pronounced, and then gave its meaning orally. E did not write down the definitions (only in case of exceptional or peculiar answers), but scored them as given. We believe, however, that a *qualitative* analysis of the verbatim definitions of children of different ages and mentality would be of great value.

In scoring, full credit was allowed for one correct meaning given (regardless of whether that meaning was the most common one), and half credit for a definition which was partially correct. No value was attached to the logical form employed in the definition, since the test is meant to explore the range of ideas rather than the evolution of thought forms. When it was clear that the child had one correct meaning for a word he was given full credit for it, however poorly the definition may have been stated. The difficulty comes in deciding when a meaning is "correct," since definitions may be of all grades of excellence. Individual differences in E's will inevitably appear here, and in order to minimize them it may be necessary ultimately to indicate definitely for each word what definitions are acceptable, what deserve half credit, what none.

Whatever standard of excellence is accepted it is bound to be more or less arbitrary. Almost every word has several different usages, to say nothing of the innumerable delicate nuances of meaning due to differences in contextual setting. Besides, our own stores of meanings are never garnered as unchanging units of intellectual riches, but instead are constantly undergoing transformation, substitution, amplification and revision. To ascertain that one S has half the vocabulary that another has, as measured by this test, may be of value in estimating their difference in ability, but it does not by any means fully represent the extent to which they differ in language mastery.

On the whole, leniency is to be commended in judging the definition for the reason that the child's power of expression runs farther behind his understanding than is true of adults, and also because for the young S the word has probably a relatively less unitary existence. We are all at a disadvantage in defining isolated words, the child doubly so. To give an idea of the standard of perfection employed in the tests

the following illustration will be of service: Afloat, "a ship floats on the water (full credit); civilly, "its when you treat a person nice" (full credit); hysterics, "you act funny or crazy" (full credit); majesty, "what you say in speaking to a king" (full credit); copper, "something you make money out of" (full credit); sportive, "to like sports" (half credit); pork, "meat" (half credit only unless kind of meat can be specified). It is seen from this that a very liberal standard has been employed. Questioning for the sake of drawing out meanings was not resorted to except in rare instances to overcome the child's timidity. Usually the responses were quickly made and not infrequently the most absurdly incorrect definitions were struck off with amazing confidence.

The vocabulary list was not devised until a large part of the testing had been completed, hence we have data for only 161 cases, ranging from 5 to 13 years of age. The following table shows the main results:

TABLE IX.

The Growth of Vocabulary as Indicated by the New Vocabulary Scale Applied Individually and Orally.¹

Age.	Median Age.	Median Test Age.	Number of Pupils.	Median Vocabulary.	Vocabulary Reached by Two-thirds.
6	6.5	7.5	5	2500	2300
7	7.5	8.3	14	2600	2300
8	8.5	9+	28	3900	3600
9	9.5	10—	35	5000	4000
10	10.58	10+	24	6000	4500
11	11.5	11	29	6100	5500
12	12.4	11.5	19	7700	6500
13	13	11.5	7	8800	7400

¹It is not at all certain, of course, how written and mass tests would compare with these results, though presumably they would give a somewhat lower index.

With the exception of year 6, where the cases are too few to afford even a tentative norm, it is seen that the vocabulary index shows a fairly stead growth. For further experimentation the point reached or passed by two-thirds of the children of any year will be tentatively assumed as the test norm for that year. Our test, as may be seen by comparison, gives a larger percentage index than Kirkpatrick's, because it is composed of words on the whole somewhat more common; but it necessarily gives on the average a smaller absolute vocabulary since it is based on 18,000 instead of 28,000 words.

(Concluded in the May number.)

PERIODS OF WORK IN LEARNING.

DANIEL STARCH, PH.D.,

University of Wisconsin.

SUMMARY.

In learning to associate numbers with letters, it is more economical within limits to shorten the periods of work and to distribute them correspondingly over a given period of time. The most favorable length of period for this work seemed to be between ten and twenty minutes.

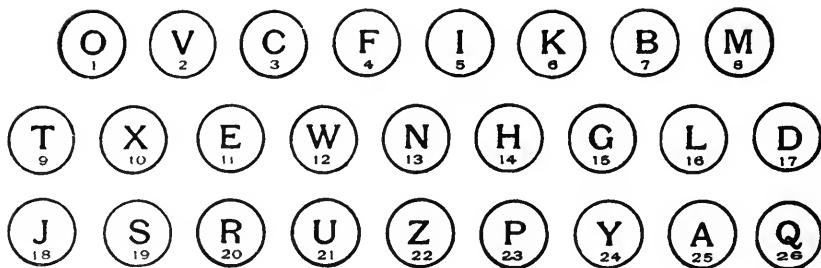
The effect of the distribution and length of periods of work upon the rate of learning has been studied by various investigators. Ebbinghaus¹ found that in learning a series of twelve syllables, sixty-eight repetitions made in immediate succession were not as advantageous for later relearning as thirty-eight repetitions distributed over three days. Jost², also working with syllables, found that two repetitions a day for twelve days were better than four repetitions a day for six days, and the latter were better than eight repetitions a day for three days.

The problem of the present investigation was to determine whether this principle of the distribution of repetitions holds in other fields of learning, and whether it also applies to longer periods than the few minutes that the experiments of Ebbinghaus and of Jost required.

The learning process consisted in associating a number with each letter of the alphabet. The material used in the experiment consisted of six blanks each containing a "keyboard" of letters and numbers at the top, and connected prose on the left-

¹Ebbinghaus, *Grundzüge der Psychologie*, Zweite Auflage, 657.

²Jost, *Die Assoziationsfestigkeit in ihrer Abhängigkeit von der Verteilung der Wiederholungen*. *Zeitschr. f. Psych.* 14, 436.



Q=26

sentences of Latin or Greek,
he cannot get through a simple
sum of arithmetic, without
making a slip at some stage
of the process, because he
loses his attention. Year after
year he goes on indulging this
slovenly habit of mind; the
remonstrances of teachers
are of no avail; he will not
take the pains to be cured;
the inaccurate desultory
knowledge of many things is
more acceptable to his mind
than the accurate knowledge
of a few, and so he grows up
and goes into life unfit for any
Intellectual calling, unfit
for any business or profes-
sion. Then again there is
another kind of inaccuracy
which consists in ignorance
of the first principles or
beginnings of things; when
the student has to go back
not without difficulty, for
there is always a painfulness
and awkwardness in learning
last what ought to have been
learned first. We all know
what is meant by a man being
"a bad scholar," which to one
who has studied Latin and
Greek for ten or more years of
his life is justly held to be a
reproach. And there are bad
scholars, not only among
students of Latin and Greek,
but in every department of
knowledge, in Mathematics

hand margin. Figure 1 shows one of the blanks in reduced form.³ Each letter is enclosed with a number in a circle. The work consisted in learning to transcribe the prose into numbers by writing the appropriate numbers into the squares opposite each line of print. As the work progressed the numbers were gradually associated with their corresponding letters, which resulted in greater speed of transcription.

In order to determine the relative advantages of different periods of work, the persons participating in the experiment were divided into four groups. The first group worked ten minutes at a time twice a day for six days. The second group worked twenty minutes at a time once a day for six days. The third group worked forty minutes at a time every other day for six days. And the fourth group did the entire task at one continuous sitting. In each case the total time was 120 minutes. The subjects worked at the same time of each day as nearly as possible. Those working twice a day had an interval of at least five hours between the two periods. Each person was instructed to make a check mark at the end of every five minutes of work. This could be done without much disturbance by having a watch near by and starting when the minute hand was on a number.

Forty-two students took part in the experiment: twelve in group one, fourteen in group two, nine in group three, and seven in group four.

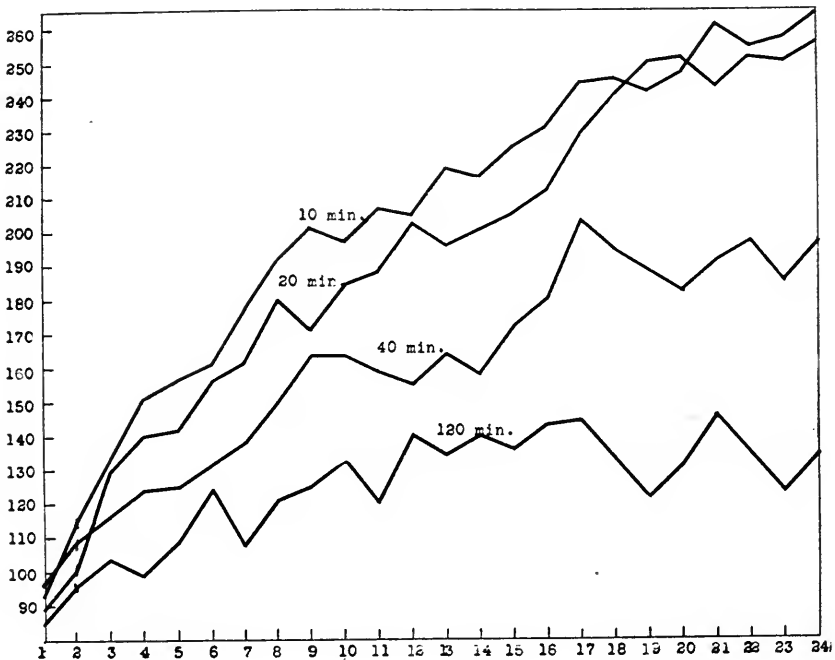
The results are set forth in Fig. 2. The units on the base-line represent the successive five-minute periods and the vertical units represent the number of letters transcribed in each five minutes. The designations, ten minutes, twenty minutes, etc., above each curve indicate the lengths of the periods of work of the different groups.

Within the limits of the experiment the records show that the shorter and the more numerous the periods of work are the more rapid is the improvement. The curves begin close together, but after the first few minutes of work they at once begin to spread. The ten-minute group climbs most rapidly, the twenty-minute group is a close second, the forty-minute

³This blank is slightly modified from one devised by Professor Jastrow several years ago.

group is third but considerably lower, and the two-hour group is a distant fourth.

If still shorter periods of work than the ones employed in the experiment were tried, the probability is that there would be a limit of economy in distributing and shortening the periods. This is indicated by the fact that the advantage of the ten-minute group over the twenty-minute group is not as great as the advantage of the latter over the forty-minute group. The twenty-minute group averaged thirty-one letters more in every five minutes of work than the forty-minute group, whereas the ten-minute group averaged only ten letters more than the twenty-minute group. The indication is that the advantage of still greater distribution and shortening of periods of work would be overbalanced by the loss of adaptation or "warming up" at the beginning of each period. There is, quite obviously, a point of diminishing returns, an optimal



distribution and length of the period of work beyond which the expenditure of energy becomes less economical.⁴

Why are shorter and more numerous periods more economical? The main reason, no doubt, is the well-known fact that a period of rest after newly formed associations gives them a chance to become settled and fixed. The slower rate of improvement of the third and fourth groups is due in part to fatigue. The forty-minute group shows no gain in the last period, and the two-hour group shows no improvement after the first hour. A third minor factor was that those working for a short period at a time were more apt to work with maximum concentration than those working for longer periods.

⁴This assumption is corroborated by a similar experiment made by Dearborn, if I correctly interpret his data. The group working ten minutes once a day did better than the group working twice a day, five minutes at a time. Here the distribution has apparently gone beyond the optimal point. Dearborn, *Experiments in Learning*, *Journal of Educ. Psych.* 1, 383.

ACQUISITION AS RELATED TO RETENTION.

NAOMI NORSWORTHY.

Teachers' College, Columbia University.

SUMMARY.

Eighty-three students were tested for their rate of learning and their ability to recall immediately after the learning period and after a lapse of thirty days. The more rapid learners showed the higher percentage of recall in both tests.

The object of this experiment was to ascertain the relationship between rate of learning and power of retention. The subjects were 83 mature students who were in a class in educational psychology, and who were interested in proving the truth of the maxim, "Easy come, easy go." The material used was a German-English vocabulary of 1200 words, prepared by Professor Thorndike. There were two sets of papers—the study set and the test set. On the former were the German words with their English equivalents, on the latter the German words only. The words were arranged in numbered groups of ten, the corresponding groups in the two sets containing the same words, the order within each group being different. Each student studied twenty minutes a day for five consecutive days, using the study set and memorizing at least forty words, and as many more as she could each period. At the end of the study period she took the test set and wrote in a book provided for the purpose the English equivalents of the words studied. At the end of the five days each student had studied at least 200 words. Two days of rest were allowed and the work was repeated with the same list. After two more days of rest the words were studied for a third time. At the close of the third week each student had studied three times at least 200 words, and as many more as

she could. As a matter of fact, no student had stopped with the 200, but each one had done more than that minimum. Before the work was begun each student had gone over the entire list of words in the test series, and written the English equivalents of any which were familiar. These were subtracted from the number learned in determining the amount accomplished during the experiment.

At the first meeting of the class after the study periods were over they were asked to write the English equivalents of fifty German words chosen from among the 200 which had been studied three times. A month after this test another series of fifty words, chosen in the same way, was given. The students expected the first test, but knew nothing of the second test.

The results are given in Table I. Column I is the total number of words correctly memorized during the practice periods, minus the number known before beginning the experiment. Column II is the percentage of words remembered correctly at the first test. Column III gives the deviation of each record from the median per cent. remembered. Column IV gives the percentage of words remembered four weeks after the first test. Column V gives the deviation from the median.

TABLE I.

	I.	II.	III.	IV.	V.		I.	II.	III.	IV.	V.
No.	No. of words correctly learned.	Per cent. remembered in first test.	Dev. from Med.	Per cent. remembered in second test.	Dev. from Med.	No.	No. of words correctly learned.	Per cent. remembered in first test.	Dev. from Med.	Per cent. remembered in second test.	Dev. from Med.
1	923	72	+ 9	76	+14	43	440	65	+ 2	50	-12
2	800	64	+ 1	78	+16	44	435	88	+25	70	+ 8
3	730	78	+15	71	+ 9	45	431	92	+29	90	+28
4	720	77	+14	68	+ 6	46	431	68	+ 5	64	+ 2
5	709	72	+ 9	78	+16	47	425	60	- 3	48	-14
6	704	96	+33	100	+36	48	425	46	-17	46	-16
7	698	82	+19	82	+20	49	423	63	0	60	- 2
8	692	62	- 1	70	+ 8	50	409	38	-25	36	-26
9	690	75	+12	75	+13	51	405	36	-27	18	-44
10	672	78	+15	88	+26	52	403	42	-21	30	-32
11	655	88	+25	88	+26	53	389	56	- 7	60	- 2
12	642	73	+10	74	+12	54	388	52	-11	34	-28
13	619	79	+16	80	+18	55	380	21	-42	36	-26
14	609	70	+ 7	62	0	56	375	54	- 9	56	- 6
15	590	75	+12	62	0	57	373	42	-21	32	-30
16	588	72	+ 9	72	+10	58	368	52	-11	—	—
17	581	36	-27	52	-10	59	368	39	-24	60	- 2
18	580	69	+ 6	56	- 6	60	362	—	—	8	-54
19	577	79	+16	82	+20	61	360	36	-27	36	-26
20	570	65	+ 2	48	-14	62	355	52	-11	48	-14
21	563	90	+27	94	+32	63	353	31	-32	22	-40
22	563	82	+19	88	+26	64	346	60	- 3	64	+ 2
23	560	75	+12	68	+ 6	65	346	40	-23	40	-22
24	560	41	-22	28	-34	66	320	78	+15	—	—
25	549	86	+23	96	+28	67	319	50	-13	—	—
26	547	58	- 5	88	+26	68	317	58	- 5	48	-14
27	547	50	-13	48	-14	69	314	51	-12	14	-48
28	540	70	+ 7	14	-38	70	280	73	+10	42	-20
29	533	62	- 1	92	+30	71	270	55	- 8	—	—
30	531	33	-20	54	- 8	72	256	0	-43	—	—
31	525	84	+21	84	+22	73	250	29	-34	0	-62
32	513	66	+ 3	68	+ 6	74	220	23	-40	80	+18
33	504	51	-12	86	+24	75	220	23	-40	4	-58
34	486	49	-14	68	+ 6	76	218	54	- 9	44	-18
35	485	67	+ 4	24	-38	77	214	82	+19	76	+14
36	482	88	+25	90	+28	78	210	89	+26	20	-42
37	480	65	+ 2	62	0	79	210	31	-32	10	-52
38	478	81	+18	66	+ 4	80	209	—	—	48	-14
39	472	70	+ 7	—	—	81	208	54	- 9	—	—
40	469	66	+ 3	—	—	82	200	40	-23	22	-40
41	468	61	- 2	82	+20	83	177	50	-13	52	-10
42	447	77	+14	64	+ 2						

In Table II these results are condensed. Column I gives the number learned. Column II the average deviation from the median for each group in the first test. Column III gives the average deviation from the median for each group for the second test. Those students who learn more than the median number of words are also above the median in the two tests of retention, and vice versa. The rapid learners retain more than the slow learners.

TABLE II.

No.	I. No. Words Correctly Learned.	II. Av. Dev. from Med. First Test.	III. Av. Dev. from Med. Second Test.
1.....	700 or over.	+14	+16
2.....	600	+13	+15
3.....	550	+ 5	+ 2
4.....	500	+ 0.3	+ 8
5.....	450	+ 5	+ 3
6.....	400	— 2	—10
7.....	350	—20	—23
8.....	300	— 7	—21
9.....	Under 300	—17	—26

The average per cent. remembered in the first test by the top half of the class was 70; for the lower half the per cent. was 52. The first quarter of the class remembered 75%; the fourth quarter 50%. The first group, who memorized at least 900 words, has an average of 76% remembered; the ninth group, who memorized under 300 words, an average of 46%. The same relation holds in the second test a month later. The rapid learners having retained a larger per cent. than the slow learners. Table III shows these results. The Pearson coefficient of correlation between the number learned and the average number remembered in the first test is .41; with the second test it is .50. The coefficient of correlation between first and second test is .60.

TABLE III.

Number.	Av. Per Cent. Remembered First Test.	Av. Per Cent. Remembered Second Test.
First Half of Class.....	70	73
Second Half of Class.....	52	47
First Group.....	76	78
Ninth Group.....	46	36

The results of this experiment coincide with those reported by Dr. Pyle in the June number of this JOURNAL—namely, a positive correlation between rate of learning and retention. The method differs from those hitherto reported, in that the time remains constant and the amount learned varies. This frees the student from the responsibility of deciding when he has thoroughly memorized the material—a responsibility which brings a very varying personal equation into the problem. It also frees the investigator from the burden of making a fair allowance for imperfectly learned material.

The difference between the quick and slow learner in the ability to retain is probably even greater than the figures show. The students who learned three times as many words as others not only spent a shorter time in acquiring the 200 words on which they were tested, but also had possible interference from the added vocabularies learned, and had to retain the 200 for a longer period of time. The quickest students must have completed their review of the 200 words from which the test words were drawn, in the first study period of the third week, while those who were the slowest could only have completed them perhaps one period before the test. The quick ones were therefore tested on material held from a day to a week longer than the slow ones.

COMMUNICATIONS AND DISCUSSIONS.

PHONETIC KEYS AND THE SCIENTIFIC ATTITUDE.

Editor Journal of Educational Psychology:

Dear Sir—I am in receipt of a collection of documents which so well illustrate an attitude that is unfortunately met with occasionally in scientific circles, and so impedes the progress of the discovery of truth, that it seems worth while to point out its unscientific character.

These documents comprise a letter from the president of the Iowa State Teachers' College and five replies to this letter by certain individuals who apparently made up the committee to report on the universal key-alphabet.

Personally, I am not interested in the key-alphabet. I don't know one kind from the other, but I am interested in children and in their education, and I gather from one of these letters that the comfort, welfare and happiness of children is somehow concerned with this question of the adoption of a key-alphabet. To an outsider like myself, having an interest in the child, the situation appears as follows:

Somebody has proposed a universal key-alphabet which was endorsed by the Department of Superintendence at Mobile, Ala., in February, 1911.¹ A certain psychologist has taken the trouble to determine by experiment whether this proposed key-alphabet is adapted to children and is better for them than the old so-called Webster alphabet. These results have been published. The afore-said president of the Iowa State Teachers' College sends a letter to certain gentlemen, in which he says: "I desire to have your views regarding the value of the Whipple tests, as well as your reasons why the Department of Superintendence should not reconsider the action then taken."

It will be noticed that he does not ask whether the action should be reconsidered, but wishes reasons why it should not be reconsidered. As for the gentlemen whose answers are published, it may be

¹This action was rescinded at the St. Louis meeting, February, 1912.—*Eds.*

said that they have merely given what was asked for. President Seerley does not tell us how many opinions were solicited, how many were received or whether he reproduces all of those that were received.

The five answers published, taken as a whole, are among the most remarkable documents ever presented in a controversy. So far from evincing a desire for truth, the spirit of all five reminds me of the famous advice of the counsel for the defense to his colleague, in which he said: "We have no case; abuse the plaintiff's attorney." The way in which these worthy gentlemen abuse the psychologist who has made this investigation leads the reader to believe that they are more desirous of seeing their own opinions win than they are to have the truth.

One of these gentlemen (?) even goes so far as to insinuate that the investigator has brought in results and settled his verdict to please the men who paid the bill. Surely there is an ethical code in academic circles which forbids one member of the profession to make such an insinuation in regard to another. Why, even politics is outgrowing that sort of thing! We recently held a Gubernatorial contest in our State of New Jersey in which there was nothing of this kind from either Democrat or Republican ranks. Each party to the contest treated the other as a gentleman throughout the struggle. Shall we in the scientific and literary realms acknowledge that our code is lower than that of the politician?

But for the argument. I find nowhere in these letters any suggestion that the matter should be decided in accordance with examinations of children, but rather that the question has already been decided, and must be forced upon the children by the weight of the authorities who have adopted the revised key. Only two of the letters make any suggestion as to wherein the investigator has erred, and wherein, consequently, his results are not satisfactory; and these suggestions are in the midst of longer paragraphs which amount almost to abuse of the investigator.

One writer remarks that the investigator's results are contrary to reason. He says, "One has only to look at the two alphabets to see which is the shorter, the simpler, the easier to write and the better adapted to mnemonic processes." This gentleman should be informed that most of the discoveries of science have been considered contrary to reason at first.

Another one of these writers says: "The pupils of this country deserve the best, and should not be forced to ride in a mediaeval cart instead of a modern carriage," and then naïvely adds: "We should find a specialist, a phonetician, a philologist or one informed as to modern methods of teaching English." If the proposed key is solely for the use of specialists, phoneticians, philologists, and the like, we may agree with this; but if it is for the use of *children*, how absurd is such a method of determining its value! Not only do these writers contradict themselves, but they contradict each other. One lays great stress upon the fact that the revised alphabet is much easier to learn than the old. Another one declares with emphasis that the time involved in learning the alphabet makes no difference. Another one refers to the "apparently biased tone" of the investigator. To the reader of these letters this is amusing, in view of the evidently biased tone of all the writers.

Finally, another writer admits that the proposed key alphabet is not perfect, and could be advantageously changed in details. To this, one is tempted to say, "If it can be improved, why insist upon forcing this alphabet upon the children without first making it as perfect as possible?"

I am making no attempt to point out *all* the illustrations of bad logic and wrong spirit in these letters, but only enough to call the reader's attention to their general tenor and tone.

In conclusion, may I make a suggestion? Why could not these gentlemen have been big enough to say, "Here is someone who proposes to submit these two alphabets to a careful test to determine which one of them is best adapted to childhood. His experiment is not quite satisfactory to us, but the idea is a good one. Let us have more experiment and abide by the result. If the revised alphabet is not the best, then let us have the best." But it is discouraging, or it would be, if there were any very considerable number of scholars who proceeded in this prejudiced way, to find these gentlemen taking the course they have of making ungentlemanly insinuations as to the honesty of the investigator and urging their claims by the sheer force of their names and authority. Have we not a higher code than this, and if we have it not, may we not create such?

HENRY H. GODDARD.

Vineland, N. J.

MENTAL MEASUREMENTS IN SCHOOLS.

In the December number of *THE JOURNAL OF EDUCATIONAL PSYCHOLOGY* there appeared an article on "Methods of Mental Measurements in Schools and Colleges," in which the point was made that the results of group tests be recorded as compared to the group average, letting that average appear as 50. Several arguments were advanced in favor of this system, among which was the valuable consideration that results would become much more intelligible to laymen. It is difficult to see, however, why the writer should have chosen as the base of his system of records the number 50 when the per cent. basis would have met all his requirements, and, in addition, would employ the common language of ratios.

That per cents are much more intelligible to laymen than are other form of comparison may not be appreciated by one very familiar with mathematics, but observation will show that it is true. Recently in connection with the question of dividing a certain class into sections I had occasion to compute the coefficient of correlation between arithmetic and geography grades. The coefficient was found to be 0.635. I found it difficult to make this mean much to the other persons involved in the discussion until it occurred to me to mention that this meant $63\frac{1}{2}$ per cent. of correlation. I found the meaning then became plain. Similarly it would be clearer to say that a pupil taking the watch test for hearing was graded at 105 per cent. of the average than to say that his score was $52\frac{1}{2}$. In the latter case the base of 50 might easily be overlooked, whereas the term per cent. indicates the base number.

Other advantages for recording data in per cents of an average have come to my notice while employing this method in arithmetic tests. In order to make the point clear I give below a brief test so recorded. The scores are entered in terms of per cents of the group average, and next in terms of the standard determined by Prof. S. A. Curtis, so that pupils may readily compare themselves with their own group and with the standard determined by wider experimentation. The preparation of these columns of percentages requires very little labor, since they may be read from a slide rule; or, where the basis of comparison is an established norm, tables may be prepared from which the per cents may be directly copied:

READING ADDITION COMBINATIONS, NINTH GRADE. TIME, 1 MIN.

Score.	Cases.	F. V.	Per cent. of Av.	Per cent. of Standard (65).
90	2	180	134	138
88	1	88	131	135
82	1	82	122	126
76	1	76	113	117
75	2	150	111	115
73	1	73	108	112
72	2	144	107	111
M. 70	1	70	M. 104	M. 108
66	1	66	98	102
64	1	64	95	98
61	1	61	91	94
60	2	120	89	92
54	1	54	80	83
52	1	52	77	80
48	1	48	71	74
46	1	46	68	71
40	1	40	59	62
<hr/>		<hr/>	<hr/>	<hr/>
21		1414	A. D. 17.4	Av. 104
		Av. $67\frac{1}{2}$ additions.		

In the arithmetic tests commonly used it is customary to compute average deviation rather than standard deviation. Using the column of per cents of the average, the experimenter can very easily do this. The deviations above the average may be read by dropping the hundreds; these are multiplied by the frequencies and added. By doubling the sum so obtained the computing of the deviations below 100 may be omitted, since they must equal those above. It will be observed that the A. D. thus obtained is a coefficient of variability, and admits of direct comparison with similar results from other data with varying averages or dissimilar units. Of course, if the A. D. is required in the units employed in the test it may be obtained by multiplying by the average expressed in the original units.

Records such as the above are frequently employed in computing the coefficient of correlation, since comparisons may be desired with rate of motor activity, memory span, etc., and in this case standard deviation must be found. The per cents will be found very convenient for this purpose, since the deviations above and below are easily written by inspection, and the somewhat tedious process of correcting for the estimated average is avoided.

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DANGER SIGNALS IN CLINICAL AND APPLIED PSYCHOLOGY.

During a recent tour of observation carrying me into several States and cities where psychological studies of defectives are under way, I have been impressed by certain tendencies which are becoming increasingly evident, and which bode ill for the future of applied, and especially for clinical, psychology.

I. The opinion seems to prevail that *any person of intelligence is qualified to make mental diagnosis*, but that none but qualified physicians can make general physical or neurological diagnoses. This opinion has undoubtedly risen, in part, from the popularization and widespread use of the Binet-Simon tests, which, in appearance at least, are fairly easy of application. Now, I think it will be admitted by all who are competent to judge that mental are more difficult to diagnose than are physical abnormalities. It would be less absurd to expect intelligent business men, or physicists, or preachers to be able to examine sick persons or to diagnose diseases from reading a book on physical diagnosis than to expect grade teachers, social workers, lawyers, or even physicians not specially trained in psycho-clinical and psychiatric methodology, to be able to determine the mental status of psychically abnormal persons by reading a syllabus of mental tests and by giving a few of the stock tests. Even the Binet-Simon tests have a very limited value, so far as concerns the *mental diagnosis* of individual cases. They afford only an approximate idea of an individual's mental station—of his degree of arrest or acceleration. To be sure, this information is of the greatest practical value. But the fact is that these tests give us only the *first* word, not the *final* word, in the mental diagnosis of any case. Properly to diagnose a given case requires much more than merely putting an individual through a few stock tests (a fact that was clearly recognized by Binet); and it is safe to say that *no one is qualified to make a satisfactory examination or diagnosis who does not possess considerable experience in the actual working up of case histories of various kinds of mental defectives*. Mental examiners and diagnosticians are made, not born. Skill in psycho-clinical work comes from the mastery of clinical methodology, under the guidance of a master and through the first-hand study of cases.

II. If what I have just said be granted, it follows that, *in the selection of proper directors for the clinical and research work in*

the psycho-clinical laboratories, poor judgment is shown by the appointing powers in some institutions and schools. In some recent cases the appointees have been grade teachers who have spent a summer in some laboratory, or teachers who have spent a year or so in a school of education or in a psychological laboratory, or persons who have a good all-around education, but who are neither men of science nor mental clinicians. It is easy to see what appointees with such limited qualifications are and are not able to do. On the positive side, these workers are probably able to carry out certain tests quite satisfactorily, particularly if they have been in attendance at clinics. They have the ability to make certain routine examinations. They can, say, administer quite satisfactorily the Binet-Simon tests (particularly if they have been trained to do so), and locate a child in this scale. But they are very probably unfitted for the two highest functions of a psycho-clinician. First, they are incapable of giving a satisfactory psycho-clinical diagnosis of individual cases, and second, they are unable to conduct research; that is, to prosecute productive and constructive work. If institutions and schools merely desire someone to carry out certain routine tests, or to classify individuals mentally by a graded scale (Binet-Simon), then persons of limited training, experience or education may answer the purpose. But no person other than a trained expert is able properly to diagnose and prescribe for individual cases or effectively to conduct original investigation. The constructive development of clinical psychology will be much retarded unless experts, definitely trained in clinical and scientific procedure, are placed in charge of the laboratories.

III. *The lack of a uniform, standardized procedure in the administration of the Binet-Simon scale* has become surprisingly apparent—but lack of space forbids a recital of the details. Not only so: numerous changes and alterations in the scale (1908) are being made constantly; practically every worker has some change to propose, and various workers have already issued, or are about to issue, altered or revised scales. These revisions are often based on the testing of a ridiculously limited number of boys and girls in each age, many of whom very probably are, in addition, untypical. Just now we need to do two things: first, we need to subject the 1908 Binet-Simon scale to a protracted wide-range tryout on large masses of approximately normal boys and girls in each grade, and second,

we need to establish age-norms of various traits not tested in the scale, to the end that the trait-norms thus established may eventually be fitted into the scale, so that the number of tests in each age may be somewhat increased.

In order to avoid the confusion which will inevitably arise from the use of various altered or revised Binet-Simon scales, and from the following of individual methods in the giving of the tests, I would make the following recommendations:

1. *The 1908 scale should be considered as the standard scale, at least in research work, and a standardized method of giving each test in the scale must be strictly followed.* No one is entitled to criticize the scale who has simply played with it (sampled a few of its tests); and no one is justified in asserting that he is using the Binet-Simon method who is following a procedure of his own in giving a limited number of tests.

2. *Examinees should be tested several mental ages below and above (particularly) the age in which they grade.* This is desirable for purposes of individual diagnosis (clinical aim), and is absolutely essential if we wish to give the tests for the purpose of testing out the accuracy of the scale (research aim).

3. *Anyone desiring to employ tests not contained in the 1908 scale should arrange these in a parallel scale, to be kept entirely distinct from the 1908 scale.* Such separate tests are already available in two (three with Terman's) 1911 revisions and alterations of the 1908 scale, and others are to be published shortly. It is extremely desirable that these and other tests should be tried out, standardized, 'normalized,' and, if they eventually prove satisfactory, be added to the proper mental ages in the 1908 scale. But it is just as desirable that all supplementary tests be kept separate until we are prepared to make a scientific reconstruction of the 1908 scale. There seems to be no other way of retaining the valuable tests in the old scale, some of which have already been discarded, and others of which may receive a like fate, or of more thoroughly testing out this scale than has yet been done, or of thoroughly testing out the new tests in the 1911 revisions, or any new tests which may be suggested in future, or of securing comparable data from different workers. Under this proposed arrangement it will be entirely possible for any investigator to state his results in terms of the *one uniform scale* (1908), as well as in terms of any revised scale which he desires to employ.

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ABSTRACTS AND REVIEWS.

CHARLES H. OLIN. *Phrenology*. Philadelphia: The Penn Publishing Company, 1910. Pp. 169.

Once in a while it is the part of discretion to shoot a dead crow. Such a crow is the "science" of reading "character from the shape of the head." Phrenology rests upon four fundamental principles: (1) The brain is the organ of the mind. This is true. (2) The mind may be reduced to a number of faculties. This is false, particularly if one considers the faculties found on a phrenological chart of localization. (3) These faculties are seated in definite regions. That is absolutely absurd. There is not the slightest resemblance between the phrenologist's localization of function that we find in physiological psychology. (4) "Knowing the mental faculties which are situated behind these different places, the phrenologist is able to judge of the development merely by the form of the head." This is preposterous nonsense.

But the phrenologist reads character successfully. This he does by observing facial expression, conduct, dress and general appearance, by skillful use of leading statements, and by indulging freely in bald generalities. In this work he is often a skilled artist, and any young man who pays a dollar for his chart certainly gets his money's worth in good advice. But the phrenologist is an imposter because, instead of saying to the candidate, "Let me look at your face and dress," etc., he says, "Let me measure scientifically the conformations of your cranium." The reason is that the latter pays, while the former would not. Mr. Olin's book is true to the type.

C. E. S.

SHEPHERD IVORY FRANZ. *New Phrenology*. Science, Vol. 35, March 1, 1912. Pp. 321-328.

In his presidential address before the Southern Society for Philosophy and Psychology, Washington, December 28, 1911, Dr. Franz

subjects to caustic criticism some current views of the cerebral localization of mental functions. The old phrenology of 100 years ago, based on the crude anatomy of Gall and Spurzheim, is pretty thoroughly discredited, but its fundamental conception of one function for one part of the brain has widespread ramifications in present-day theories of brain physiology. One does not have to go far in the literature to find reference to percept centers and concept centers, to the writing center and the reading center, to the auditory speech center and the motor speech center, and so on.

The most recent development of the new phrenology is the histological localization of mental processes. Elliott Smith, Campbell, Brodmann and others have distinguished from 18 to 50 histologically distinct areas, and have assumed for them correspondingly distinct mental functions. It is true that we are not always given a complete description of the mental process which goes on in each area, but this is only a matter for the future. Campbell, for example, does not hesitate to assign the sensations of touch, temperature, pain and movement to the area immediately behind the fissure of Rolando, while the region just back of that contains the corresponding percepts, touch localization, and the so-called stereognostic sense. In like manner Campbell distinguishes visuo-sensory and visuo-psychic areas, areas for muscular memory, etc. Bolton and Kappers go even so far in their phrenological speculations as to assign different types of mental activity to different layers of the cortex. In all of this the author thinks the new phrenologists have outstripped the old. Cells and cell groups may be localized, and there is partial agreement on the symptoms that accompany certain definite lesions, but there is no more ground for assigning specific mental functions to particular brain areas than for assuming a bump of combativeness or a bump of acquisitiveness.

J. C. B.

NOTES AND NEWS.

An inspection of the Twenty-third Annual Report of the New Jersey Training School for Feeble-Minded Girls and Boys increases our appreciation of the broad philanthropic spirit which characterizes the direction of that institution. The first and most insistent demand upon such a school is undoubtedly the local one of ministration to the needs of its pupils, and that this demand is admirably met at Vineland is evident to the casual visitor. The latest advances of knowledge in the medical, psychological, pedagogical and social sciences are eagerly utilized by an alert and capable staff, under the guidance of a sympathetic and inspiring superintendent. But the Vineland school differs from many of our institutions in that its work does not stop here. Its mission is conceived in a broader spirit than the mere satisfaction of local needs. The tremendous opportunities that are offered for research into the nature and causes of feeble-mindedness are clearly recognized, and, as far as limited resources will allow, these opportunities are used to advance the bounds of our knowledge. It is a veritable laboratory for the study of arrested development in the child. Largely through its influence the State of New Jersey has appropriated considerable sums for research, and has adopted a comprehensive plan for the welfare of its defectives—the first state in the Union to attack this problem scientifically. The plan includes the training of teachers and physicians, medical and psychological inspection of school children, inspection and study of delinquents, employment of school nurses, establishment of special classes in the public schools, and suitable custodial provision for all who need institutional care. Furthermore, the Vineland institution is performing a national service in arousing popular interest in the problem of defectives, and in disseminating knowledge of the most approved methods of dealing with them. In carrying out its far-reaching plans, however, the management is greatly hampered by lack of funds. The school is not a state institution, and cannot receive any appropriation from the state for buildings or improvements. To effectively prosecute the great work that lies at hand the institution should have an endow-

ment of at least a million dollars. It would be difficult to find a more promising "business investment" than is here offered to philanthropically disposed persons. Nowhere could the expenditure of money realize greater returns in the welfare of humanity. J. C. B.

On February 26-29 the Department of Superintendence of the N. E. A. held its annual meeting in St. Louis. At the same time were

held special sessions of the National Council and
THE ST. LOUIS of the Department of Normal Schools, and the an-
MEETINGS. nual sessions of the National Society for the Study

of Education, the Society of College Teachers of Education, and several other organizations. These mid-winter meetings are considered by many the most important educational meetings of the year, and judged by the number in attendance and the interest manifested in the topics proposed for discussion, the St. Louis gathering was one of the most successful that has ever been held. One's estimate of such a meeting necessarily rests upon general impressions, but in the opinion of the writer three characteristics were fairly prominent: First, there was a refreshing absence of the undertone of political intrigue which has been all too conspicuous in some of the N. E. A. meetings. The objects and interests of the meeting were educational, and educational topics were the ones discussed in the lobbies and corridors of the hotels. Second, a large proportion of the attendance consisted of educational specialists, either from colleges and universities, or from the administrative and instructional forces of the public schools. This took away some of the atmosphere of dilettantism which too frequently characterizes educational meetings and tends to make them vague and fatuous. There was a surer touch, a firmer grasp of the problems presented. Finally, perhaps owing to the specialists, there was more definiteness in the formal papers and more genuine discussion of the points raised than is usually observed in such meetings. It has become almost a truism that an educational meeting is the place above all others to hear breath wasted. Trivialities and time-worn platitudes are dished up with oratorical garnish and served hot to an uncritically devouring multitude. Far be it from me to intimate that there was none of this at St. Louis. Fashions do not change so quickly. But on the whole the speakers gave evidence of really having something to say, and at times the discussions showed a healthy disagreement with the views advanced. J. C. B.

The dominant topic in all the meetings was efficiency in education. But what is efficiency? How can we determine what sort of educational procedure is efficient? We must first **EFFICIENCY** establish standards or norms of efficiency; we must **THE KEYNOTE.** have units of measurement to apply to educational results. The plans of the committee appointed to devise such tests were outlined by Professors Strayer and Elliott and Superintendent Van Sickle. It is natural that in a gathering of this sort efficiency should be considered primarily from the administrative point of view. Already in the administration of school systems we have a great deal of material in the way of records and reports which might be utilized in working out standards of efficiency if the data were given in such form as to be usable. Unfortunately, there is little uniformity in such reports, and much of the material is worthless, because it cannot be correctly interpreted. Remedies for this condition were proposed, and received a careful hearing.

Economy of time was a topic which loomed large in the discussion of efficiency, and sessions were devoted to its consideration, both by the Council and by the Department of Superintendence. There is no doubt that much time is wasted by pupils in elementary schools, and it is gratifying to find school superintendents grappling with the problem. It is an open question, however, whether the statistical studies of retardation have not resulted in undue emphasis on promotion, to the neglect of the kind of teaching that children should have. Emphasis on promotion puts a premium on holding the age-grade level constant, and altogether neglects the individual difference of children. Some children need to be held back; others need to go ahead rapidly. As one speaker put it, we should beware that our promotion machinery does not swamp the child.

The value of investigations by outside experts to determine the efficiency of school systems received a great deal of attention. It is indeed hard for us to see ourselves as others see us, but if the vision of others is dimmed by the dust and heat of controversy, or if they have forced upon them the blinders of preconceived judgment and are told what they are expected to find, their observations may be even worse than useless. Fortunately, contemporary investigating committees stoutly refuse to have their eyes hampered in any way. The trouble is that the political influences claiming to represent the people serenely pursue their own ends, quite regardless of the reports of investigating committees.

Another important aspect of the efficiency problem which was the object of much discussion was the diversification of the course of study to meet the needs of individual pupils. This and the scientific study of the art of teaching individual subjects seem to the writer to lie at the very root of efficiency. It may be, as some vociferously claim, that we are trying to teach individual pupils too many things at once, but certainly our curricula, both in the elementary and the high school, are bound to become richer rather than poorer. The school must provide for each child such an education as his abilities and opportunities require. Hence the increasing demand, voiced in St. Louis, for special schools, special courses, vocational training in the upper elementary grades, and far greater diversification of all sorts in the high school. One proposal for meeting the administrative difficulties of this diversification was the establishment of a junior high school.

Aside from a brief account of the use of tests in arithmetic, the development of the science of teaching had no place on the program. This is, after all, the central problem of efficiency, and its neglect clearly shows how far practical school men are from a realization of the aim which the public sets for them—the efficient education of all the children. Yet it is gratifying to note that there is a quickened sense of responsibility in the matter, and that the way is being cleared of administrative obstructions, so that in time the fundamental problem of teaching may be reached. J. C. B.

At the business meeting of the Department of Superintendence, after spirited presentation of the advantages of different cities, it

ACTION ON THE was decided to hold the next meeting in Philadelphia. A resolution to adopt the simplified spellings of certain words was laid on the table.
PHONETIC KEY
RESCINDED. It was evident that the investigations upon the proposed phonetic key alphabet, which have been

referred to in these columns, had brought about a decided change of attitude on the part of the members, for a resolution further endorsing that key was promptly tabled, and a subsequent motion to rescind the action taken on the key at the Mobile meeting was carried by a large majority. There is little doubt that the ill-advised attacks made by the advocates of the key upon Professor Whipple's investigation contributed materially to this result. Many of the members must have felt as did Dr. Goddard, who expresses himself

in another section of this issue. We hail this action, therefore, as a vote of confidence in the application of experimental methods to educational problems, and as opposed to the acceptance of the mere opinions of those who claim to be authorities. J. C. B.

The topics for discussion at the meeting of the Harvard Teachers' Association, held on March 9, were "The Measurement of Educational Products," Prof. E. L. Thorndike, Teachers College, Columbia University; "Measuring Educational Processes Through Educational Results," Dr. Leonard P. Ayres, Russell Sage Foundation, and "Tests of College Efficiency," Clyde Furst, Carnegie Foundation, and Prof. Edwin F. Gay, dean of the graduate school of business administration, Harvard University.

At the Southern Commercial Congress, to be held at Nashville, Tenn., April 8-10, 1912, an evening will be devoted to a detailed consideration of the South's educational recovery. Representative speakers have been invited from each of the Southern States, "and each one will come prepared with statistical proof of the contrast between conditions of 1860, 1870 and 1910, and in a ten-minute address will define the ideal and hope and aspiration of the State for which he speaks."

The Italian Psychological Society held its first meeting in the Institute of Experimental Psychology, at the University of Turin, October 15-17, 1911. Most of the papers dealt with the results of experimental investigations of sense psychology. Two had some bearing on educational psychology: "The Methods of Modern Psychology," Prof. Sante De Sanctis, and "Quantitative Experimental Researches on Types of Mental Work," Prof. Maccagno. The next meeting will be held in Rome, October, 1912.

Among the resolutions adopted by the Kansas State Teachers' Association at the forty-ninth annual session, November, 1911, we note the following: "Statistics recently prepared by high authorities concerning the prevalence of venereal disease are so astounding as to be almost beyond belief. Almost without exception these investigators, as well as social workers and sanitarians, believe that the social evil can never be satisfactorily met until sex hygiene is properly taught in the public schools. Much sickness and most mental disturbances can be prevented if certain normal physiological processes are understood and a purer moral atmosphere created by frank authoritative discussions of the things every high school child should know. We recommend that this urgent but delicate

duty be accepted as one of the responsibilities of the teacher and school administrator, and that the various local attempts at solution be made public through our educational system."

The teaching of sex hygiene will not be introduced into the schools without opposition on the part of conservatives. Dr. Hermon Cassini, a member of the School Board of Orange, N. J., made a vigorous protest at a recent meeting of the Board against the continuance of sex hygiene as a part of the curriculum in the schools of that city. Dr. Cassini averred that twenty-eight pupils of one school had been ordered by their parents to cease attending school on account of the teaching in sex hygiene, and that several physicians agreed with him that the subject was not a proper one to be taught in public schools. The statement of Dr. Cassini brought out much opposition. Commissioner Abrams contended that the subject was one of the best ever taught in the schools, and he was supported by enough of his colleagues to make the vote on the question of continuing it result in a tie. It was finally decided to refer the matter to the teachers' committee for a quiet investigation.

The year 1912 has seen the establishment of four new journals which are of interest to educational psychologists. We are glad to welcome *The English Journal*, James Fleming Hosie, managing editor, Chicago Teachers College, published monthly, September to June, by the University of Chicago Press, subscription price \$2.50. The journal contains original articles, reports, communications, news notes and editorials, and presents a very clean-cut, businesslike appearance. We trust that when it gets fairly established it will endeavor to arouse interest in experimental work on the teaching of English. *The Kansas School Magazine*, Edgar F. Riley, editor-in-chief; J. H. Glotfelter, business manager, published monthly, except July and August, at Emporia, Kans., subscription price \$1.25, is decidedly superior to the ordinary state school journal. The original articles set a high standard of excellence, and the editorials are permeated with the inquiring spirit of the times. The typographical work might in some cases be improved. In France the League of National Education has undertaken the publication of a *Revue mensuelle d'éducation nationale*, issued at 3 Rue Dante, Paris. The League is throwing itself into a work of national regeneration. The Italian psychologists, Sante De Sanctis, G. Villa, E. Morselli and R. Assagioli, announce the publication of "*Psiche*": *Rivista di studi psicologici*, with editorial offices at 46 Via degli Alfani, Florence.

They aim to offer a thoroughly modern psychological journal, which will reflect the present status of the subject in its relations to philosophy, science and life. Each number of the review will be devoted to a single topic.

The School of Education of the University of Kansas has recently issued a Professional Directory of Administrators and Teachers in Accredited High Schools of Kansas.

Prof. Maria Montessori has opened a school at 12 Via Giusti, Rome, for the training of teachers in the use of her primary methods as developed in connection with the "Houses of Childhood."

The *Société libre pour l'étude psychologique de l'enfant*, of which Prof. Alfred Binet was the president and guiding spirit for ten years until his death last autumn, has recalled as its active president M. Buisson.

Dr. J. Carleton Bell of the Brooklyn Training School for Teachers will give two courses in the Summer School of New York University, one on "Educational Psychology," with especial reference to the control of human behavior, and the other on "The Psychology of the Elementary School." The latter course will include a detailed analysis of the educational activities of the child from the kindergarten to the high school.

Dr. Bird T. Baldwin, professor of education and director of the School of the Art of Teaching, University of Texas, has been called to head the new department of psychology and education at Swarthmore College.

Dr. Samuel P. Hayes, professor of psychology in Mt. Holyoke College, has been granted a leave of absence for the second semester. He will spend the time abroad, chiefly at Cambridge University.—*Journal of philosophy, Psychology and Scientific Methods*.

Elizabeth Kemper Adams, associate professor of philosophy and education at Smith College, has been advanced to professor of education in that institution.

Dr. Arthur Holmes, assistant professor of psychology at the University of Pennsylvania, has been appointed dean of the faculties in Pennsylvania State College.

Prof. Herman Henderson of the Wisconsin State Normal School at Milwaukee will offer courses in the psychology of education at the Oberlin College Summer School.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

JAMES ROWLAND ANGELL. *Chapters from Modern Psychology*. New York: Longmans, Green & Co., 1912. Pp. vii, 308. \$1.35 net.

This volume contains the first series of lectures delivered upon the Ichabod Spencer Foundation at Union College during the early part of 1911. In eight lectures an "attempt has been made to convey a just and comprehensive impression of the principal features of the psychology of today, freed as far as possible from the technicalities of scientific terminology."

LEONARD P. AYRES. *A Scale for Measuring the Quality of Handwriting of School Children*. New York: Russell Sage Foundation, 1912. Pp. 16.

Handwriting exists primarily to be read. That handwriting is the best that can be most easily read. Ease of reading may be shown by the time required. Upon these assumptions Dr. Ayres set out to construct a scale for the quality of handwriting. First, 1578 samples were collected from school children of 38 States. Each of these samples was then read by 10 investigators, and each reading was accurately timed. Each sample was rated in words per minute, and from these a scale was constructed with samples of three styles of writing at each 10-point interval from 20 to 90. Due credit is given to Professor Thorndike's pioneer work in the construction of a scale for handwriting, but it is pointed out that the present scale is constructed solely on the basis of legibility. It would be interesting to have each scale evaluated in terms of the other. It will be observed that neither scale takes any account of speed of execution—an important factor in the teaching of writing.

LEONARD P. AYRES. *The Relation Between Entering Age and Subsequent Progress Among School Children*. Reprinted from *Education*, February, 1912. Pp. 9.

A study was made of the school history of 25,000 children in respect to their entering age and their subsequent progress in school. It was found that children entering at advanced ages made slightly more rapid progress than those who enter younger, but that the entering age of six furnishes the most homogeneous group, judged on the basis of subsequent progress.

EDITH N. BUCKINGHAM. *Division of Labor Among Ants*. Reprinted from *Proceedings of the American Academy of Arts and Sciences*, Vol. 46: 1911, No. 18. Pp. 425-507.

A study of the behavior of these classic insects which should not be

overlooked in any discussion of instinct. A more detailed notice will follow.

MAXIMILIAN P. E. GROSZMANN. *Legal Provisions for Exceptional Children*. Reprinted from Proceedings of N. E. A., July, 1911. Pp. 1070-1077.

An examination of the compulsory education laws of the various States reveals the fact that practically no provision is made for mentally defective children other than to excuse them from school attendance. In view of the close connection which has been shown to exist between mental retardation and criminal incorrigibility, it would seem that society is neglecting one of the most obvious measures of self-preservation.

MAXIMILIAN P. E. GROSZMANN. *The Backward Child vs. the Feeble-Minded Child*. Reprinted from American Journal of Obstetrics, Vol. 65: 1812.

"There is a vast difference between the relatively few cases of abnormal conditions and the far greater number of children who are handicapped in many other ways. There is a difference between *arrested* development which can go no farther, and *retarded* development which may produce power and genius; between backwardness and feeble-mindedness; between the bad boy and the criminal. Let us give the feeble-minded and abnormal class the attention it needs. But let us emphasize the fact that education is largely concerned in the saving of those who can be saved, in the uplifting of those who can be uplifted."

HERMAN HARRELL HORNE. *Free-Will and Human Responsibility*. New York: The Macmillan Company, 1912. Pp. xvi, 197. \$1.50 net.

A simple, straightforward discussion of the perennially interesting question, "Does the fate of man rest at all with himself or not?" The arguments for determinism, drawn from science, philosophy and theology, are presented in as convincing a manner as possible, and then refuted from the same sources. The pragmatic attitude toward free-will is neatly summed up.

ALEXANDER JAMES INGLIS. *The Rise of the High School in Massachusetts*. New York: Teachers College, Columbia University, 1911. Pp. 166. \$1.50.

A valuable piece of historical research, tracing the development of the high school in Massachusetts to 1860, and involving the examination of practically every report of every town from 1838 to 1863.

J. A. MACVANNEL. *Outline of a Course in the Philosophy of Education*. New York: The Macmillan Company, 1912. Pp. x, 207.

There is a distinct need for an adequate treatment of education

from the philosophical point of view. As the author says, "the rough notes and suggestions furnished in this outline are but words along the way." Nevertheless, Professor MacVannel has made a most commendable beginning. A philosophy of education, he believes, should aim at the solution of three problems: (a) to trace the significance of education in its main outlines as a conscious, historical effort toward human evolution; (b) to determine the meaning and purpose of the educational process in its functional relation to the wider intellectual and social process of the present and to the general process of life and reality, and (c) to formulate an educational ethics. The philosophical treatment of education properly emphasizes the need of examining critically the postulates and hypotheses which are assumed in educational practice and in the narrower fields of theory.

SALVADOR MASSIP. *La reforma de la escuela*. Habana: La Propagandista, 1912. Pp. 22.

A plea for the reform of Cuban schools along the lines of vocational education inaugurated by Kerschensteiner in Germany and advocated by Snedden in this country.

Mathematics in the Elementary Schools of the United States. Bulletin 460. Washington: Bureau of Education, 1911. Pp. 185.

A valuable presentation of what is actually attempted and accomplished in mathematics in the elementary schools of this country. It is the report of the American Committees I and II of the International Commission on the Teaching of Mathematics.

Mathematics in the Public and Private Secondary Schools of the United States. Bulletin 463. Washington: Bureau of Education, 1911. Pp. 187.

A companion to the report just mentioned. The two together give an admirable survey and criticism of the work in mathematics in the public schools.

ERNEST CARROLL MOORE. *Present Tendencies in Secondary Education*. Burlington, Vt.: University of Vermont, 1911. Pp. 20.

A vigorous arraignment of the narrowness of the present traditional high-school course, and a plea for at least nine different types of courses in every first-class high school. "I am one of those who is convinced that the modern high school, to be a training school for life, must be throughout a vocational school."

ERNEST CARROLL MOORE. *Report of the Examination of the School System of East Orange, N. J.* Issued by the Board of Education, 1912. Pp. 64.

This report is full of practical suggestions on all matters of school

work from the teaching of reading to the functions of the Board of Education.

FRED MUTCHLER AND W. J. CRAIG. *A Course of Study for the Preparation of Rural School Teachers*. Bulletin 469. Washington: Bureau of Education, 1912. Pp. 23.

Papers Presented for Discussion at the Meeting of the Society of College Teachers of Education, St. Louis, Mo., 1912. Graduate and Undergraduate Courses and Degrees in Education. Normal Schools and University Departments of Education. The Present Status of Education as a Science. The School Review Monographs, No. II. Chicago: The University of Chicago Press, 1912. Pp. 153. 56 cents, postpaid. To be reviewed.

JOHN W. RITCHIE. *Primer of Sanitation*. Yonkers-on-Hudson, N. Y.: World Book Co., 1911. Pp. 200. 60 cents, postpaid.

JOHN W. RITCHIE AND JOSEPH S. CALDWELL. *Primer of Hygiene*. Yonkers-on-Hudson, N. Y.: World Book Co., 1910. Pp. 184. 48 cents, postpaid.

Two books, prepared by professors of biology, scrutinized and criticised before publication by a large number of experts, and aimed to supply the pupils of the elementary schools with all that is needed for the comprehension of personal hygiene and sanitation. The treatment is scientific, straightforward, well proportioned. The illustrations are clever and well designed to impress youthful readers. We commend these books to teachers in the grade schools.

W. H. SMITH. *All the Children of All the People*. New York: The Macmillan Company, 1912. Pp. x, 346.

The author of the "Evolution of Dodd" here presents in a popular form some of the puzzling problems that have arisen in the experiment of universal education. There is much sound sense in the book and abundant vital (but good-tempered) criticism of the present organization of American education. Instances of shortsighted criticism are, of course, to be expected. From reading Chapter XXII, for example, one is led to infer that the higher institutions have solved the problem of educational values by adopting the elective system, and the author believes that many of the defects of the lower schools could be corrected by adopting the same system "from top to bottom." We are told that "any study is of educational value that the student genuinely loves," and that any study which is pursued from any other motive is "a bore and a cheat." Criticism of this sort, it is clear, virtually charges the schools with an impossible task. When social life is so organized that everyone may do the work that pleases him and decline to do anything in which he fails to find an interest, the principle of free election may well be adopted in deter-

mining educational values. The briefest study of the elective system in American colleges will show that it is far from ideal, and whatever virtues may be apparent in its operation in German universities they are strictly conditioned by the thorough preparatory training of the German student—a training in which not a vestige of the elective system is to be found.

Statistics of State Universities and Other Institutions of Higher Education Partially Supported by the State. Bulletin 468, Washington: Bureau of Education, 1912. Pp. 23.

W. J. SUTHERLAND. *Some Sources of Waste in Education.* Published as a Quarterly Bulletin of the Platteville (Wisconsin) State Normal School, 1911. Pp. 16.

Three chief sources of waste are emphasized: (a) unjustifiable aims of education, of which the disciplinary aim is the most significant illustration; (b) overburdened curricula, with the attendant difficulty of concentration upon any one topic; (c) inefficient practices in teaching, especially in the assignment of work and in the drawing of generalizations.

ERNEST L. TALBERT. *Opportunities in School and Industry for Children of the Stockyards District.* Chicago: The University of Chicago Press, 1912. Pp. 64.

The large problem of vocational direction in the public schools is considered in a practical way. The district studied is peopled by immigrants of various races, and their children seldom remain in school after the fourteenth year. The statements of principal, teacher, child and parent unite in the conclusion that the public school is not meeting the needs of adolescence and adjusting the child to his future work. A solution of the problem would be to have a well-qualified person in each public school as a vocational adviser—a person who would study the advancement, tastes, and changing interests of growing boys and girls, and keep a record of their progress. Facts pertaining to wages, treatment and qualifications of workers in specific vocational lines should be given the children to study. Visits to factories, stores and workshops should be supplemented by talks to the older pupils by business men, professional men and representatives of labor unions.

CLARA HARRISON TOWN. *The Binet-Simon Scale and the Psychologist.* Reprinted from the Psychological Clinic, Vol. V, No. 8, January 15, 1912. Pp. 239-244.

The author cautions against the danger of indiscriminate use of the scale by amateurs, and shows by extensive quotations that Binet himself foresaw and endeavored to guard against such a danger. Some of Dr. Ayres' criticisms were forestalled by Binet, and others were not well founded.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

PSYCHO-ANALYSIS AND EDUCATION: THE VALUE OF SUBLIMATING PROCESSES FOR EDUCA- TION AND RE-EDUCATION.¹

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In a previous paper² on the relation of psycho-analytic work to the problems of education, I laid especial stress on what may be called the *negative* aspects of education, that is to say, on the avoidance of measures calculated to produce lasting injury on the child's mind, and I pointed out a number of respects in which present-day methods fell short of even this humble ideal. In the present paper I propose briefly to call attention to some *positive* aspects of the relation between psycho-analysis and education, namely, certain respects in which the knowledge gained through psycho-analytic work could be made use of for educational purposes to great advantage. The knowledge in question relates to the process known as sublimation, one which is at the basis of a great part of educational endeavor.

The word "sublimation," borrowed from the terminology of chemistry, was introduced by Freud to denote a psychological process defined by him³ as "the capacity to exchange an original sexual aim for another one which is no longer sexual,

¹Read before the American Psychological Association at Washington on December 29, 1911.

²*Psycho-Analysis and Education*. Journal of Educational Psychology. Nov., 1910. P. 497.

³Freud. *Sammlung kleiner Schriften zur Neurosenlehre*. Zweite Folge, 1909. S. 181.

though it is psychically related." In another place⁴ he defines it as "a process by which outlet and application in other regions is opened to over-strong excitations from the individual sources of sexuality." A few general remarks on this subject will be necessary before we can discuss the bearing of it on education.

It has of course long been recognized that the sexual instinct supplies important contributions to more general mental tendencies and capacities, the evidence for this being principally of two kinds: In the first place the close association and even resemblance between the sexual impulse and such activities as those of religion and art leave no doubt in the mind of most thinkers that the former furnishes a considerable body of feeling which finds application in these spheres. Some authorities would go so far as to trace religious and artistic activities entirely to the sexual instinct, and indeed the evidence in favor of this view is much more extensive than is generally appreciated, but the commoner opinion is that the instinct merely adds some of its own peculiar feeling and impulses to religious and artistic tendencies that are already present in the mind, and which originate in other sources. This problem does not concern us here, and it need only be repeated that the main point is accepted by practically all writers, namely, that at all events *some* of the driving force behind the impulses and interests of art, religion and many other mental activities is derived from the sexual instinct. The following passages illustrate this idea; very similar ones might be quoted from Metchnikoff, Moebius, Schopenhauer, and many other writers. Bloch says⁵: "Aus diesen innigen Beziehungen zwischen sexueller und geistiger Produktivität erklärt sich die merkwürdige Tatsache, dass gewisse geistige Schöpfungen an die Stelle des rein körperlichen Sexualtriebes treten können, dass es psychische *sexuelle Äquivalente* gibt, in die sich die potentielle Energie des Geschlechtstriebes umsetzen kann. Hierher gehören viele Affekte, wie Grausamkeit, Zorn, Schmerz und die produktiven Geistestätigkeiten, die in Poesie, Kunst und Religion ihren Niederschlag finden,

⁴Freud, *Drei Abhandlungen zur Sexualtheorie*. Zweite Auflage, 1910. S. 83.

⁵Bloch, *Das Sexualleben unserer Zeit*. Zweite Auflage, 1907. S. 100.

kurz, das ganze *Phantasieleben* des Menschen im weitesten Sinne vermag bei Verhinderung der natürlichen Betätigungen des Geschlechtstriebes solche sexuellen Aequivalente zu liefern, deren Bedeutung in der Entwicklungsgeschichte der menschlichen Liebe wir noch näher zu betrachten haben." Loewenfeld⁶ similarly declares: "Dass die Libido oder überhaupt die Sexualität einen sehr bedeutenden Einfluss als Triebkraft auf das seelische Leben ausübt, hierüber sind alle jene, welche sich mit diesem Probleme beschäftigten, einig."

In the second place, experience has shown that various activities possess in a high degree the power of diverting sexual impulses, and of thus alleviating undue tension of sexual origin. The general recognition of this fact is illustrated by the frequency with which the advice is given to those leading an abstinent life, or struggling with the habit of masturbation, to apply their interest and impulses to sport, work, and so on. That the energy thus won from the sexual sphere represents a cultural gain and has proved of the highest significance in the progress of civilization is also widely appreciated.

There are, however, several matters in this connection that are not commonly recognized, and which are of considerable importance in regard to the problems of education. The usual view of sublimation, one implicit in most writings on the subject, is that it is a process whereby the normal sexual desire of an adult becomes, more or less consciously, replaced by an interest in other matters. This conception contains, as we shall see, a number of important errors; they may be summed up by opposing the following statement: Sublimation concerns not so much the normal sexual desire as the individual components of the sexual instinct; it refers to the child far more than to the adult; it is an unconscious process, not a conscious one, and it does not consist in a replacement. These points may next be considered in detail, and in the reverse order from that just given.

(1) The exchange of the secondary social aim for the original sexual one constitutes not so much a replacement of the one by the other as a diverting of the original energy into a fresh

⁶Loewenfeld. *Ueber die sexuelle Konstitution*, 1911. S. 173.

direction; the occurrence is, in fact, better described by the term displacement than by that of replacement. The conative aspects of the affects in question may perhaps be best denoted by the expression desire, or, in Freud's language, the wish. Now, without maintaining that this is, strictly speaking, a form of energy,⁷ or that the laws relating to physical energy can be directly applied to it, one cannot avoid seeing certain resemblances between it and physical energy, sufficient at all events to justify one in drawing an analogy between the two for purposes of illustration. The principle of the conservation of energy, for instance, is certainly valid in the mental sphere to a far greater extent than has generally been supposed. The careful psycho-analytic work of the past few years, and particularly that aspect of it that is concerned with unconscious mental processes, has shown with ever-increasing plainness that on the one hand desires and other affective processes are very tenacious of existence and resist decay with a really astounding vigor, and that on the other hand what appears to be a cessation of desire is frequently found on closer examination to be actually a transformation of the form in which the desire is being manifested. One feels, therefore, very inclined to venture the generalization that the same principles of conservation and transformation of energy hold in the mental as in the physical sphere. Such a theory would require a very extended experiential testing before it could be raised to a level of high probability, but the impression one receives of the truth of it is at times very intense when one over and over again witnesses how a given desire may run through a person's life, baffled here and thwarted there, but constantly and untiringly seeking for some means of expression. In psycho-analytic work one sees clearly that the process above referred to of replacement and diverting of interest is substantially one of continuity, and that the later expression is, so to speak, a psychical equivalent of the earlier one. In other words, the energy employed in making use of the new interest is derived from the old one, and the later activity is only another, more indirect, means of gratifying the same de-

⁷See on this point Bleuler, *Die Psychoanalyse Freuds*, 1911. S. 73, 74.

sire. In this way various fundamental desires may run through the whole of a man's life, though the continuity of their manifestations may be not at all apparent to the casual observer.

The reason why this continuity is in most cases not obvious is because the resemblance between the two forms of expression does not appear on the surface, and is often to be revealed only through some analytic procedure. In many instances the association between them is apparently merely a superficial one, and the fact is overlooked that this covers a deeper and inherent connection in the subject's unconscious. The transference of the desire from one field of interest to another is effected by means of the mechanisms that Freud in his *Traumdeutung* has shown to be characteristic of unconscious functioning in general; further, the causes of the transference are the same here as in other mental processes where the same mechanisms are to be observed, in relation to dreams, wit, neurosis, and so on. Most often it is largely a matter of displacement alone. The affect, or conative trend, becomes dislocated from the idea with which it was originally connected, and then associated with another more suitable one. It is important here to bear in mind that it is the same affect, or desire, that is operative in the two cases; it is not a replacement of one interest by another, but a displacement of a given affect from one idea to another, from the first interest to the second. More complex changes are brought about in the occurrence that is characterized by the replacement of one affect by another, for instance, love by hate or anger. In some cases it is believed by a number of writers that a true conversion takes place by which the one affect becomes literally transformed into the other, particularly love into fear; while others, including myself, consider that the first affect operates merely by evoking an exaggerated manifestation of the second one, which is thus in a way a reaction to a stimulus. In either event the empiric result is the same, namely, that the one affect, which is unable to find satisfactory expression, disappears from view and is succeeded by the other, which therefore stands in some generic relation to the first.

(2) It is important to bear in mind that the process of sub-

limation is mainly an unconscious one; that is to say, it takes place without the subject being aware of it. It does of course happen that, either spontaneously or on advice, a person who is troubled with a desire that cannot be gratified devotes himself to the pursuit of sport, study, and so on, and in so doing consciously sets going the first stage of the sublimating process by providing the opportunity for this, but even then the actual transference of the affect proceeds unconsciously, as one discovers through psycho-analysis. Occurrences such as these, however, comprise, as will presently be explained, only a small part of what is known as sublimation, and in most instances the whole process is entirely unconscious. This is emphasized in the following passage of Loewenfeld's,⁸ who fails, however, to draw some very obvious inferences from it: "Dabei muss noch wiederholt betont werden: *Nicht die im Bewusstsein sich vordrängende Libido, d.h. das als solches fühlbare geschlechtliche Verlangen ist es, was die förderlichen Einwirkungen der Sexualität auf unser Seelenleben zu stande bringt. Dieser Einfluss kommt lediglich der in das Unterbewusstsein herabgedrängten oder überhaupt nie in das Bewusstsein gelangten Libido, resp. den ihr entsprechenden zentralen Erregungen zu.*"

(3) Of predominant importance in regard to the problems of education is the fact that the process of sublimation is much more a matter of childhood mentality than of adult. Any sublimation that occurs in adult life is but a feeble copy of the enormous extent to which it goes on during childhood, especially during the first half of this; in fact, the weaning of the child to external and social interests and considerations, which is the essence of sublimation, is perhaps the most important single process in the whole of education. The spontaneous activities and interests of children are totally different from those that are the aim of educational strivings, and they have to be replaced by these. In accordance with the principle mentioned above, however, this replacement is not so much the putting of fresh educational interests in the place of the earlier spontaneous ones as the diverting of fundamental desires and

⁸Loewenfeld. Op. cit., S. 180.

interests into new channels; it is the utilizing of the same energy in other ways. Appreciation of this fact would lead to a much closer study than has hitherto been made of the nature of the energy that stands at our disposal for educational purposes, and of the forms in which it spontaneously manifests itself. Teachers empirically recognize the importance of presenting their subject-matter in such a way as to appeal to children, but the efforts so far made in this direction have been based on a very inadequate study of what the primary interests in children that have to be appealed to really consist in. From Clark University appeared recently a stimulating paper⁹ containing the data of a questionnaire on "the spontaneous constructions and primitive activities of children," including such matters as the kind of things children *spontaneously* do with snow, sand, earth, string, stones, knives, and so on. This paper of Acher's is valuable not only for the extensive data it contains, but also for the clear-sighted vision shown for the immediate bearing of these on the problems of education. I cannot do better than quote the following passages from it: "The student of child study who is familiar with the material that has been collected in the past two decades on this subject cannot but be impressed with the great difference which exists between the theory of education which this child study investigation suggests on the one hand and the theory which underlies much of the actual school work on the other. It is quite evident that there are many instincts and interests of children already revealed by these investigations which are not taken account of and utilized by the school programme of to-day. * * * It thus becomes the imperative duty of educators to follow this course of development and work with the current of psychic evolution and not against it as is so often the case at present. * * * It is becoming more and more clear as the child study material accumulates that the child has feelings, motives, instincts and interests that should guide the educator in his work rather than that the educator should undertake to direct and modify the child's development. The child must be allowed to evolve naturally and

⁹E. A. Acher. American Journal of Psychology. Jan., 1910. Vol. XXI. P. 114.

in harmony with its racial inheritance. But in the school work of to-day the social inheritance of comparatively recent times continues to be imposed on the child and the deeper impulses of its soul are scarcely touched. * * * It is needless to say that there are hundreds of other vague instincts, motives and interests in the child's soul besides those above referred to. The full and complete expression of these would give every child a richness of mind that would characterize it all through life and enlarge its sphere of interests to an extent hardly dreamed of now."

There are, unfortunately, two serious deficiencies in Acher's work, deficiencies that are inherent in his method of approach, and which need to be remedied by work done along other lines that may serve as a complement to his observations. Namely, he omits to trace either forwards or backwards the spontaneous activities studied by him. On the one hand, not developing the principle of the displacement of energy discussed above, he fails to indicate the precise educational and social uses to which these activities can be put, nor does he discuss the normal fate of the tendencies in question. On the other hand, he fails to see that they are not, as he thinks, primary in nature, but are themselves the outcome of still deeper and older tendencies present in the individual from the earliest childhood. This could not, of course, have been determined from a mere questionnaire inquiry, and well illustrates the limits of this method. By psycho-analysis of the individual one is enabled to trace in great detail the psychogenesis and later evolution of each of these activities, and if a sufficient experience demonstrates the presence of constant features in this evolution one can with considerable probability formulate certain generalizations along these lines. It may be said that anyone accustomed to psycho-analytic work could at once interpret the majority of Acher's observations in terms of still more primitive childhood tendencies, and also indicate a variety of later manifestations in which they might become expressed. This matter will presently be considered from another point of view.

(4) The process of sublimation is concerned with much deeper agents than mere ungratified sexual desire. The whole

subject is commonly discussed in a superficial manner as if it were a question of the individual being disappointed in love and seeking consolation in the arms of religion, of work and what not, or of his being spurred on by the stimulus of love into some artistic or other activity. For instance, Loewenfeld¹⁰ constantly tests the significance of sublimation for scientific and artistic work, etc., by trying to correlate a given production with a possible love affair. Such things may presumably happen, but they constitute a very small part of what is meant by the term sublimation. It cannot be insisted on too strongly that sublimation is concerned not so much with normal sexual desire, in the narrow sense, as with the individual biological components of the instinct, i. e., with the various infantile tendencies that later on form the basis of erotic desire as well as of many other (non-sexual) interests. This is clearly of cardinal import for education, for it means that sublimation is not a matter of displacing for other purposes a diffuse energy, but an accurate and specific transference of energy from one given field of interest to another; each special later interest corresponds with a special primary component of the sexual instinct.

In psycho-analytic work one also obtains an insight into the function served by the process of sublimation and the forces that bring it about. It is found that the earlier tendencies that are in this way displaced by later ones are of such a kind as to be unacceptable to the social and ethical standards of a civilized community, and therefore also to those of the child as soon as he begins to be subject to the pressure of his environment, *i. e.*, after the age of about six months. They concern such tendencies and traits as preoccupation with his own body, and especially with particular parts of this, interest and pleasure in various bodily functions, especially those of excretion, curiosity about such questions as the difference between the two sexes, the origin of babies and the nature of married relations, selfish inconsideration for others, jealousy and resentment at being disturbed or interfered with, and so on, tendencies which modern writers group under the broad term

¹⁰Loewenfeld. *Op. cit.*, S. 190, 191, 210, 220, etc.

of sexual. These tendencies have to be renounced by the child, the completeness and ease with which this is accomplished varying greatly from one instance to another. They, of course, become forgotten in later life, or, as it is technically called, "repressed"; this is one reason why they are so extensively ignored by adults, and the significance of them for childhood development greatly underestimated. They do not, however, die, as is generally supposed, but undergo a transformation, finding an outlet in more suitable modes of expression, and thereby furnishing energy of incalculable value for social and educational activities; this is the process of sublimation.

It is difficult to furnish actual instances of sublimation that would carry due conviction, because one is not justified here in assuming any considerable familiarity with unconscious mental processes, so that the instances given will run the risk of appearing like mere unsupported and improbable assertions. With this reservation, however, the following remarks may be made. It has fallen to me, as to most other psychoanalysts,¹¹ to have the opportunity in a great number of cases to trace the impulses that led various persons to enter upon their respective profession or employment, and even matters so important as this one finds to be dictated by unrealized and buried tendencies to a far greater extent, in comparison with external inducements and opportunities, than is generally supposed. These external factors, important as they may seem to the casual observer, are often but the pretext for the expression of some primary, submerged striving. A child, for instance, who has conquered a sadistic love of cruelty may when he grows up become a successful butcher or a distinguished surgeon, according to his capacities and opportunities. One in whom the exhibitionistic fondness for self-display was pronounced may develop into an actor, an auctioneer or an orator. There comes to my mind a patient who as a child had shown an unusually strong interest in the act of micturition, in the guidance of the flow, in the power of it, and so on: when a little older he was passionately fond of playing

¹¹See Stekel, *Berufswahl und Kriminalität*, Archiv für Kriminalanthropologie und Kriminalistik, 1911, Bd. XLI., and Fortmüller's review of Ostwald's *Grosse Männer* in the Zentralblatt für Psychoanalyse, Jahrg. I, 1911, S. 348.

with streams and puddles, manipulating them in every possible way; he is now a well-known engineer, and has constructed a number of canals and bridges. Others, whose primary interests concerned more solid excretions, sublimated these in their childhood through various games ("spontaneous activities" of Acher), and later became—one an architect, another a sculptor, a third a type-moulder, and so on; one, finding that solid substances were more easily moulded and played with after they had been heated, developed a fondness for cooking and became a chef. It is not maintained that these factors were the only ones operative in determining the choice, and still less that the professions named are always chosen as a result of the particular unconscious agents just mentioned, but extensive experience of the tenacity, vigor and durability of such unconscious factors forces one to estimate their importance much more highly than is generally done.

Returning to the subject of education, we have to note that processes similar to those just indicated in connection with general matters, such as the choice of a profession, are also at work in narrower and more specific interests of childhood life. Whether a particular subject, geography, history, etc., will appeal to a given child, and whether he will be successful in his studies of it, very largely depends on the special aspect that is first presented to him, and on the extent to which this aspect associates itself with interests already existent in his mind. On the other hand, special difficulty that a child may have in acquiring a given subject is often due, not, as is generally thought, to any inherent deficiency in this respect, but to inhibitions that originate in a more primary interest with which the subject has become secondarily associated, and which has transferred on to the latter its own affects, difficulties and conflicts. The main thesis of this paper is that a fuller knowledge of the primary interests and tendencies of the child would enable us to devise methods of education that would, as it were, link on the tendencies we wish to implant to those already existing, and thus by accurately diverting the primary interests utilize them for social and educational purposes with much greater effect than is achieved by our present empirical and rule-of-thumb methods.

If these principles are accepted the question inevitably arises as to whether they are at all compatible with the present system of mass teaching, or whether on the contrary they do not lead to an insistence on a more individualistic system; the importance of the question lies in the fact that it is a practical one, so that the value of the principles will probably be estimated by it. It cannot be denied that the weight of the foregoing considerations must be added to that of evidence from very different sources which goes to show that much greater attention will have to be paid to the individual child if the best results are desired. Indeed, this whole question may be regarded as settled on the scientific side; it is now merely a financial one. In this connection, however, we may add the following consideration: As has been insisted on by both Freud¹² and Loewenfeld,¹³ there are distinct limits set by nature to the extent to which sublimation is possible, and it is, above all, important to bear in mind that these vary enormously with different individuals. Our present system of forcing all children except those obviously defective through the same intellectual mill is probably productive of much less harm than our even stricter custom of exacting, under fearful penalties, a uniform moral, social and ethical standard of behavior. In all these respects there should be a greater regard for the individual constitution and individual tendencies, a more lenient tolerance combined with a more prescient knowledge. In every branch of education there is need of a looser rein, but also of a more clear-sighted guidance. This would give us, it is true, a greater variety in the social commonwealth—not unwelcome to those who are depressed at the monotonousness of modern life,—but also a more accurate fitting of the individual to the tasks he has to fulfil, and a much greater development of individual capacity and efficiency.

To those who are startled by these prospects we may offer the following consolatory consideration, which will show that more compromise with the existing modes of education is possible than might have appeared from the previous remarks. Experience teaches that there is a considerable stereotypy in

¹²Freud. *American Journal of Psychology*. April, 1910. P. 218.

¹³Loewenfeld. *Op. cit.*, S. 221.

the forms that sublimation of a given tendency takes, and, as there are only a quite limited number of such primary tendencies, it follows that the results of sublimation must show a considerable resemblance in a large number of individuals. So far as one can see, there seems to be no limit to the possible variations that the effects of sublimation may show, this being one cause of the fact that no two individuals are precisely alike, but nevertheless it is found in actual practice that similar paths are followed in a considerable number of cases, particularly when the environment is about the same. If, then, it is agreed that the children who deviate from the average are to be relatively neglected, much as they are at present, it should be possible to devise educational methods that are best adapted for the more usual types of sublimation. It will be obvious that the task of making the necessary preliminary investigations and of devising these methods cannot be relegated to the school teacher, who has not only neither the training nor the opportunity for such detailed investigations, but to whom certain aspects of them, *e. g.*, the sexual, may be counted upon to appear distasteful, and that it is probably a matter for the combined efforts of pedagogical and pedological psychologists. Their findings must then be communicated to the teacher, for whom it need not be obligatory to understand the rationale of them.

The problems of *re-education* meet us in several different forms, according as the subject is a neurotic or insane patient, a pervert, a criminal, or any other social failure. In all these the process of sublimation has failed to effect its social purpose, and the unsocial or morbid activity that has resulted is the product of primary childhood tendencies that have never been properly controlled; the subjects are victims of what may be called miscarried sublimation. The problems of the nature and variety of this miscarriage involve a study of many other matters besides those strictly belonging to education itself, and I will here confine myself to one of them where the relation to the latter is especially close, namely, concerning the possibility of the foregoing principles being applied to the treatment of the insane. I refer in particular to the advanced

cases of dementia where the patients often lead a practically vegetative existence. They are not only unable to do any useful work, but even to care for or feed themselves, and their activities may be reduced to the monotonous and reiterated performance of some apparently meaningless movement. Thanks to the studies of Jung, Abraham and many others, it is now known that these activities represent a distorted and degenerated form of infantile conduct of an auto-erotic kind. Defeated in life and prevented by their internal inhibitions and conflicts from permanently sublimating their inborn tendencies in satisfactory directions; *i. e.*, from "adapting themselves to their environment," they have reverted to a state of early childhood, and their interests and activities are correspondingly reduced and simplified. These are manifested mostly, as has just been remarked, in distorted and at first sight unrecognizable ways, but often enough in the naked infantile form itself; an unmistakable instance of the latter is the frequency with which the depths of dementia are accompanied by preoccupation with the dejecta, a condition which in the adult is equally troublesome and repulsive.

Many efforts have been made to divert the available energy of such patients into useful or, at all events, less repellent channels; a recent example that may be referred to is the work of Miss Kent¹⁴ on habit-formation in dementia praecox. All such endeavors that I am aware of, however, have been not only too pretentious in their scope, but have not taken into account the actual nature of the energy that is to be diverted. The interests that are intended to replace the stereotyped behavior, *i. e.*, the manifestations of the infantile tendencies, are in most cases totally disconnected with the latter, whereas every effort should be made to provide interests that would directly link onto them; to do this it is, of course, indispensable that a preliminary study be made of the precise meaning of the patient's manifestations, and therefore of the nature of the energy that is at his disposal. Further, it will be evident from the previous considerations that sublimation proceeds by gradual stages, these being, in fact, parallel with the

¹⁴G. H. Kent. Psychological Review. Nov., 1911. Vol. XVIII. P. 374.

development of the individual. One cannot, therefore, aim too high at first, but must imitate nature in advancing deliberately from one stage to the next. It seems reasonable to infer that when an adult has reverted to a condition which psychologically is very close to that of infancy, the surest way to arouse him from his apparently hopeless state would be to get him to traverse paths similar to those characteristic of infancy. A more hopeful line of work than that commonly attempted would therefore be to correlate the activities spontaneously shown by the patients with those that they correspond to in childhood, and then make use of the paths of sublimation instinctively employed by the normal child. No doubt modifications would have to be introduced to suit the special circumstances, but in general I am convinced that much could be learned for this purpose by studying closely the evolution of early childhood. There is every prospect that attempts carried out in this direction would prove of considerable value in the treatment of advanced dementia.

Fortunately, these unambitious efforts represent the least hopeful re-educational problems. With such patients it may be said that their sublimating capacities are for all practical purposes paralyzed, and one would be satisfied to be able to restore even a modest level of mental activity. In all other classes of case one aspires to loftier aims, certainly to making the individual an efficient member of society. This, however, is not the place to enter into the success of psycho-analysis in undoing the morbid development of these subjects by means of unravelling the psychogenesis of their unhealthy manifestations, and in thus enabling them to divert for social purposes the tendencies which their early education failed to sublimate. It is clear that, however brilliant such success may be from the point of view of the individual—and even here it is often hampered to a serious extent by both intrinsic and extrinsic factors,—from the point of view of society it can only be regarded as a palliative measure for dealing with a ruinous evil. It is time that society, confronted with the undiminishing hordes of her failures, began to inquire into the significance of a state of affairs that can almost be described as a bankruptcy of true education. The real meaning of this extravagance would

then be discovered, namely, that civilization has reached, or is on the point of reaching, the limit beyond which unguided sublimation can no longer be successfully maintained. The instinctive strivings of mankind have displaced from the primary inborn tendencies a mass of energy that through various social activities has built up what we call civilization, but it seems probable that the amount of energy in this way accessible is even now overdrawn. If the present level of civilization is to be maintained, and further progress made, it will become necessary to supplement the instinctive forces making for sublimation by a conscious and co-ordinate guidance. The first logical step in this direction must be a careful and unprejudiced penetration, along psycho-analytic or similar lines, into the deeper layers of the mind, particularly of that of the child. Such an investigation is bound to yield invaluable results for education, not only in the narrower sense of school teaching, but also for child-training in the broadest sense of the word. Endeavors along these lines, skilfully planned, should prove both a more ennobling and a more scientific method of raising the standards of the race than is the more facile, and therefore more popular, method of clamoring for the castration of "degenerates."

SEX EDUCATION IN JAPAN.¹

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Among other things in regard to which Americans are either uninformed or misinformed concerning the Japanese people is the question of sex education, a matter just now much discussed in pedagogical circles. There seems to be an impression on the part of some persons that the Japanese have advanced farther along this line than any other people; indeed, there are some who are of the opinion that the Japanese encourage the boys to exercise the sexual functions at as early an age as thirteen or fourteen. How this idea can have originated is a mystery, but the best way to make the matter a little clearer is to set forth as far as possible the real situation, and it is for this purpose that this article is written. For our purposes the best way to treat the matter will be to begin with the education which the children receive at home and in other places outside of the schoolroom, and then to define the attitude of the school authorities toward this question as shown by the work in the schools and by their utterances.

When we turn to the question of sex education in the home we are confronted with a difficulty in classifying the people whose ideas and practices we wish to discuss. In the West we have the very poor, the lower classes, whose morals are low; the great middle class, who form the backbone and sinew

¹EDITORIAL NOTE.—The article by Dr. Jones on "Psycho-Analysis and Education" (this JOURNAL, Vol. I, pp. 497 ff.) called forth numerous comments from our readers. One of our correspondents suggested that American educators might have something to learn from the system of sex-education that prevails in Japan. I wrote to a former student of mine, Professor Smith of Hiroshima Normal College, asking him to investigate the matter and prepare an article setting forth conditions as they actually exist. The following article is his response to this request.—W. C. B.

of the nation and its morals; and, last of all, the very rich, whose morals cannot be said to be very high, at least in some cases. But here in Japan we cannot classify our people in this way. Men of low standards of morality and men of high standards are found side by side in all walks of life. Among the lower artisan and merchant classes we find men who are as careful in these matters as they know how to be. On the other hand, there are men who have held some of the highest offices in the state, trusted ministers of the crown, great educators, and even great religious leaders, whose lives have shown that they cared but little for the first principles of common morality when such principles stood in the way of their personal indulgence.

So, instead of dividing the homes into those of middle and higher class people, we shall speak of them as those in which the children are brought up with the idea that, as men and women, they should be chaste and faithful husbands and wives; that is, conform to the main principles of sexual morality; and those families in which the parents care but little for the morals of their offspring, and show this lack of interest not only by precept (or lack of it), but by example as well.

Taking up the latter class first as being the more unpleasant of the two, we find that the children receive an education in matters of sex which is rather free, and which is more or less complete, though one can hardly admire its quality. In the first place, the children hear all sorts of talk and stories in the home itself. Much of this is of the kind that cannot be repeated in decent society. The greater freedom with which the Japanese speak of such matters as pregnancy, the bodily functions and similar subjects becomes license in these homes. As the children grow older, they come to realize more and more of what is going on around them, and the natural tendency to experiment in imitating their elders adds its quota to their knowledge. Besides this, the children of a poor man hear and see much on the street, for Japanese men, and at times women, of the lower classes speak and expose themselves in public in a way that would cause them to be arrested in an American city. Of course, the children of all classes are exposed to this sort of infection, but it is especially true of

those of the poor, who are compelled to play on the streets so much of the time. In the families of the more well-to-do, the servants are often responsible for a similar poisoning of the children's minds.

This constitutes the main part of the home and street sex education of the children of families of this class. It amounts to a filling of their minds with sex ideas of a very low grade very early in life, with no attempt at guiding the children into the right ways of looking at things. The result is just what we might expect: among the poorer classes conditions that need not be described here; among those a little better off a free use of the "Yoshiwara" and its sister institutions, and among the rich concubines and "Geisha."

But if we turn from this discouraging picture and consider the other class of homes, namely, those in which the father and mother both by precept and example teach the plain, ordinary first principles of sexual morality, we find the children in far better surroundings. The parents do talk of sex and other matters which are *taboo* in the West more freely than Occidentals do, but they do it in a way that is far less offensive than in the other class of homes. When a Western man or woman meets this sort of thing first in social intercourse with the Japanese, it does not give the shock that a similar occurrence would give in America. It seems so natural that a Westerner often thinks but little of it. But such freedom gives to children a large amount of sex knowledge in an irregular way, and there is no attempt, so far as is evident, to correct this irregularly acquired knowledge by parental instruction. Fathers do not take their boys into their confidence and explain to them the dangers of secret vice or open social evils; nor do mothers explain the mysteries of their common feminine heritage to their daughters. They are simply kept from all intercourse with any member of the opposite sex from the age of puberty, or even earlier, as a precaution against any tendency to yield to their sex impulses. It is also felt by many parents that such separation of the sexes before marriage conduces to greater happiness after it. They recognize the strength of sex attraction, and feel that it will exercise its power in fuller measure upon husband and wife if neither of

them has had an opportunity to satisfy this desire for the companionship of members of the opposite sex before marriage, even in a perfectly innocent manner.

Another source of sex education in the case of children of this class is the talk and stories of nurses and other servants in the case of the well-to-do, and of playmates and street companions in the case of poorer parents. These servants are not, as a general rule, of a very high grade morally, and the stories they tell to the children of the house are hardly conducive to purity of mind and heart. Many a child of missionary parents has learned enough from such sources to make any decent mother or father shudder, and the conditions are little, if any, better in the case of the Japanese children. Of course, not all nurses and servants are of this class, and even when they are, the mothers and fathers often try to guard their children from such things. But, nevertheless, this forms an important factor in the rousing of the sex consciousness of children of both sexes.

All summed up, we may say that the children of these families grow to manhood and womanhood with little home instruction in the real secrets of sex life, but with a varying degree of irregularly obtained knowledge, sometimes of a fairly decent and respectable character, and sometimes of the filthiest description. The only positive instruction is the strict prohibition of intercourse of any kind whatsoever between the sexes, and they are given but small reason for that.

In former days it was—and to a very slight extent it now is—the custom for an elderly woman, usually an aunt or some other relative, to accompany the bride to the house of her husband for the purpose of explaining to her some of the things which she should know at that period of her life. This comes, of course, after the girl has grown to womanhood, but when it is done it must be of great value to the bride who is fortunate enough to have such a friend or relative at this critical period. The only pity is that the young man should not have similar instruction.

Turning now to the part played by the school in sex education, we come to a more definite scheme of instruction, at least for the girls. In order to be sure that my statements are not

wholly those based upon the observations of an outsider only, I shall use only such information as has been given to me by President T. Hojo of this college, one of the four schools which stand at the head of the normal school system of Japan. The only comment I care to make upon his statements is that they tally almost exactly with what I have found in talking with other men on this subject, and hence I believe they are representative of the true attitude of most Japanese educators.

In the first place, then, it is recognized that there must be some differences between the educational scheme for boys and that for girls. These are very slight in the beginning, being nothing more than a few lessons in sewing for girls and in manual training or gardening for boys, so far as the common school is concerned. But as the higher common school, or grammar grade, is reached, separate classes are more of a necessity, and at the beginning of secondary work all co-education ceases. The boys are sent to the boys' high school (or middle schools), men's normal schools, commercial schools or technical schools, while the girls enter girls' high schools or women's normals. In these schools the curricula differ rather sharply for boys and for girls, even in the same kind of school, though the basal studies are quite similar. This is because the educational authorities recognize that if a woman is to be a proper helpmate for her husband, she must be educated nearly enough in the same way to make her able to understand his work and mental activity. On the other hand, they differentiate sharply in many things, because the object of the girls' education is to make them good wives and mothers, while that of the boys is to make them able to take their places in the world of work and struggle for existence.

In these secondary schools, at least in those for girls, there is a real effort at proper sex education. When a girl in one of these schools reaches the age of periodicity, one of the older women teachers is expected to take her aside and explain to her what this new phenomenon and its accompanying soul-awakening mean. She gives the girl needed advice as to the proper care of herself during her monthly periods, as well as warning against yielding to the newly-aroused interest in boys. The girl is also told that she should carefully avoid meeting

any boy or young man unless in the presence of an older person. This is done rather informally, rather as a friend than officially as a teacher. It is left to the teacher, however, and not to the mother, as it is felt that she, at least, should be the best equipped person among the girl's acquaintances for such a duty.

But in addition to this, there is real sex teaching in the curriculum in connection with physiology. Here the girls are instructed in the rudiments of midwifery. To be sure, not a great deal can be done at this time, but the fact that there are no boys in the class makes it possible to do some really effective teaching. So the graduates of such schools go out with at least some ideas of how to care for themselves when they find themselves about to enter upon the privileges and responsibilities of motherhood.

The boys are less fortunate than their sisters at this stage of their education, for they usually receive no instruction whatever in sex matters, except the stern prohibition of all intercourse whatsoever with women of any kind. There being no legitimate way in which a boy may associate with a girl and perhaps utilize such an opportunity for wrong purposes, such a prohibition is in some ways easier of enforcement than it might be in the West. But in spite of this there are breaches of the rule, just as there are breaches of any rule which the school authorities in any land see fit to make. A first offense is usually made the occasion of a warning to the father, and failure on his part to restrain the culprit usually results in the latter's expulsion from the school.

In some few cases individual school principals invite some well-informed physician to talk to their students on the subject of their sex natures and impulses, but this is the exception rather than the rule. The ordinary boy of the secondary school of whatever kind receives no instruction in regard to sex matters, except the prohibition mentioned above.

The whole picture presents itself, then, to an outside observer in somewhat the following light: There is a good deal of "freedom of speech" on all sex matters among all classes of people as compared with our Western standards of modesty (or prudishness), and the child gets a good deal of knowl-

edge in this way. But his knowledge is not at all adapted to the needs of the case, and probably does more harm than good to his moral development. In the schools there is, for the boys, little or nothing. For the girls there is some excellent instruction, but it is imposed from above by the educational authorities, and is not given in response to a demand for such work on the part of the general public. It therefore loses some of its force by not being an outgrowth of sentiment among the mothers and fathers of the girls. Moreover, in some cases, at least, the full value and the importance and significance of such instruction are not well comprehended by those who give it. And behind and around all this is a public sentiment on questions of sex morality that leaves much to be desired.

It may be seen from this that Japan can hardly be said to have worked out as yet a thoroughgoing system of sex education as such, but is rather just beginning to awaken to the necessity of doing something to guide her boys and girls in this matter. Everywhere among Japanese educators there is real thinking going on about the problem, and soon we may expect to find something done, though there is as yet no open movement in this direction. But that the people are being made aware of the results of this neglect in the increase of the social evil and its attendant ills is indicated by the present agitation against the "Yoshiwara" and the whole system of licensed prostitution. It is also true that, although it is still possible for a man to be a libertine and still hold a good position in the educational world, yet such things are not as common as they once were. Within a very short time three or four men have been dismissed most summarily for such conduct. Public opinion is being aroused as never before, and sex education is only the natural pedagogical corollary of such a movement. So, though we cannot say that Japan has much to teach the world in this matter as yet, still, with her splendidly-organized educational department, we may hope that she will some day work out a system that will be a real contribution to the educational knowledge of all nations.

PROBLEMS IN THE EXPERIMENTAL PEDAGOGY OF DRAWING.

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This article presents a consideration of five problems of importance in the teaching of drawing in elementary schools, prefaced by a statement regarding the significance of drawing as a type of analysis and synthesis of visual impressions.

A popular idea, now decreasing in prevalence, regards drawing as a literal representation of visual impressions. The excellence of the result is measured by the impartial exactness of the record. The ability to produce good results is supposed to be, in part, a matter of training, but to depend mainly upon native talent, and this talent is regarded as an inherent possession working by intuition. In cases where this talent does not exist, the teaching of drawing has often been regarded as of little value. On the other hand, educators in their attempt to appraise drawing from a pedagogical standpoint acknowledge the existence of special talent in drawing, but accord it the same recognition in drawing as in other subjects, for example, in language or in mathematics. They see that the confident directness of approach to the material and the facility in representing it, which are usually attributed to innate ability of a technical sort, are often the outcome of well-defined interest in some phase of the subject-matter involved and a corresponding desire to express what appeals. It can be shown that when a moderate amount of technical training has made the pencil a not wholly unfamiliar instrument, the introduction of a definite intellectual interest will often result in clearness and facility of expression on the part of one who has only ordinary graphic ability.

For example, a child of average training asked to draw the leaf bud of a beech without any previous study of the content of the material may be at a loss how to proceed, or may make a conventional analysis of his sensations and produce something in general shape like the specimen. The awakening of a specific interest as to the manner in which the scales enfold the young leaves will often remove hesitation and furnish the means of isolating and recording the pertinent items.

Any object presents a multitude of aspects which form in the mind an associated group. Not all of these aspects admit of graphic representation. Therefore, strictly speaking, there is no such thing as drawing an object. A special interest in some particular phase which lends itself to expression in pictorial or diagrammatic terms is necessary to furnish the clue to a selection of terms capable of embodying that interest.

How greatly a representation made by a skilled draughtsman, conscientious in his regard for facts, differs from an impartial record of all the visual sensations of light and dark involved may be seen if a drawing made from an object is compared with a photograph taken from the same object. The selective effect of the draughtsman's interests is evident in emphasis, often unconscious, of certain facts and the neglect of others. In modeling, if anywhere, impartial reproduction of facts of form might be expected, since in the medium of clay no necessity exists for the conventions attendant upon translating three dimensions into terms of two, as in drawing. However, comparison of a modeled representation with a cast taken directly from the object makes evident the great number of details which the mind wholly or partially ignores in forming its idea of the object. Indeed, certain details sometimes remain unseen till set forth by the impersonal mechanical reproduction.

Instances of the fact that drawing tends inevitably to become an interpretation of interests rather than an indiscriminate representation of sensations are discovered when one compares the art products of different nations. The objective material may be the same, but various national conventions are evident in the representation. An impressive illustration is found in comparing Oriental with Occidental art. The

Oriental, before his acquaintance with the West, appears not to be influenced by some effects which are prominent in Occidental art, for example, naturalistic effects of solidity and of illumination and shadow. He, however, searches out with great discrimination certain harmonious relations of line and of light and dark and of color, and makes these the leading pictorial elements. So widely do the dominating aesthetic interests of the East in objective phenomena differ from those of the West that frequently its art is unintelligible to an Occidental upon first acquaintance, while, after a somewhat intimate study of Oriental art, external nature takes on new and absorbing attractions in the light of the interpretations presented.

The foregoing considerations imply that drawing is a unique type of analysis and synthesis of visual sensations generally undertaken under the guidance of a specific interest which gives significance to certain impressions and allows others to be ignored.

Observation of actual schoolroom conditions seems to indicate that, while the pedagogical value of drawing apart from any consideration of special talent has received very general intellectual recognition, the tradition regarding hereditary ability still exerts a surprisingly strong influence in determining the attitude of grade teachers toward the subject.

Most available arguments on this topic are in the form of opinions. A series of concrete experiments which should discover what are the various aspects of objects and the kinds of expression which call forth the interest of so-called talented children, by a comparison of these with the drawings of children of average ability and of less than average ability, and should make a study of the effects of the introduction of definite intellectual interests of such a sort that because of them the drawing became a record of specified facts, would furnish helpful material regarding the relation of natural to acquired ability to draw.

The most obvious interests are generally those involved in the use of drawing as illustration in connection with other subjects. There is abundant opportunity, however, to present

the conventional pictorial problems in such a way as to call for keen intellectual analysis of the material, and thus define the method of approach for the student. For example, the representation of light and shade is a common school problem in upper grades and high schools. The student whose interest in what he sees is not primarily pictorial is likely soon to weary of this problem if it means only the study of studio material in ordinary classroom light. It is then an isolated topic instead of an introduction to the whole matter of illumination and contrasting gloom as an important source of aesthetic experience. A careful study of an object in subdued light and the same object in full sunlight, a comparison of the sharp contrast in the latter case, with the more subtle gradations in the former, a critical study of the edges of shades compared with those of shadows and of the changes in shadows as they fall through varying distances before striking the receiving plane, a comparison of the effects of both subdued and brilliant illumination with the shadowless interpretations of Oriental and of purely decorative art, introduce definitely formulated interests to supplement the somewhat vague appeal of the conventional problem.

The first problem, as stated in the following questions, proposes a study of the influence of particular interests upon children's ability to draw.

Problem I. Does special talent in drawing as observed in elementary schools consist in an inherent facility of expression or primarily in unusual interests in certain aspects of material, usually the pictorial, which lead to facility of expression because of the definiteness of the interests? Will the introduction of emphasis upon other aspects related to the interests of children who do not care primarily for the pictorial, furnish a motive for analysis and synthesis which will compensate to a degree for the lack of pictorial or aesthetic interests, and consequently result in drawings comparable in force of expression to, although differing in style from, the drawings of talented children?

Any tests will probably be more conclusive in upper than in primary grades for reasons stated later. The subject-matter selected should, of course, be the same for each class, and be

such as may readily be associated with definite current interests other than those involved in the technique of representation. The tests should be made with classes of the same grade and general ability, which include some children who have the so-called especial talent usually evident in two or three members of every school, *i. e.*, the children who produce good results when the object to be drawn is presented with emphasis upon no other interest than that which is awakened by the attempt to represent it. The method should involve on the part of one class drawing which attends to technical matters related to rendering facts of appearance. In the case of the other class, interests other than the technique of expression should be introduced, which make the drawing a means of recording observations of a limited range of specific facts. Certain topics of the other school work or some outside occupation will readily suggest lines along which specific interests may be introduced. The almost universal interest of children in nature, both plant and animal, make nature forms excellent material for such tests. The forms as such possess attractive features which make an appeal apart from practical associated activities. On the other hand, the school garden may lend particular interest to a series of drawings, *e. g.*, those showing the progress in the development of the leaves of seedlings from day to day. Autumn nature study regarding distribution of seeds gives meaning to drawings which make a careful comparison of shapes and structure, for example, of the wings of two varieties of seeds, such as maple and ash seeds. Animal forms present other avenues of approach well adapted to this problem. A method of introducing constructive interests in connection with drawing is described under Problem II, and would serve well for this test.

Comparison should be made as to the relative progress and its specific manifestations in the cases—

1. Of the talented children with those who have only ordinary ability in each class.
2. Of the talented children in one class with those in the other.
3. Of the children of ordinary ability in one class with those in the other.

In addition, a study of those aspects of objects which children of special talent spontaneously depict with most pleasure would probably contribute much toward a definition of what constitute the most common aesthetic interests as compared with scientific, constructive or other interests in the visible world.

The reason for recommending this test for upper grades rather than for primary grades is because particular intellectual interests appear to be more clearly defined in older than in younger children.

The mere delineation of familiar forms possesses a vital interest for little children. One who observes the delight of young children as they watch rapid and skilful sketching, for example, in outline, of objects which interest them, such as animals, hesitates to attribute that delight merely to recognition of the forms unless the term recognition is given a wide interpretation. An actual squirrel, for instance, furnishes a multitude of impressions, and, like most objects, has entered into consciousness in an illy-defined manner. Well-defined outline is only one of the impressions very imperfectly suggested by the object. To perfect and set forth clearly the logical outcome of this one suggestion of outline involve a high degree of mental effort in the way of analysis and synthesis.

A child in watching the production of a drawing sees related items being rapidly isolated from the mass of his partially assimilated sensations which the object has previously awakened and presented in one fairly perfected interpretation; one of an indefinite number of possible interpretations, but of its kind complete and coherent. A mental satisfaction and relief appear to accompany this clarification. From the more detailed intellectual grasp afforded by the new method of analysis and synthesis there arises a heightened sense of reality comparable to that which comes when the desire to grasp a newly-perceived object with the hands and thus to assimilate it more completely into experience is satisfied.

After seeing rapid, skilful outline drawing, children generally desire immediately to draw the same things, and thus make the new interpretation their own, as children while learn-

ing to talk repeat new words. Under the stimulation of the moment they will usually reproduce the drawings remarkably well. Such reproduction of work which they have just seen done has a different effect than the copying of printed examples. There is a motor stimulation resulting from the sympathetic response of the children to the movements of the draughtsman.

A valuable contribution would be the outcome of tests which should determine whether this early and general interest in comprehending the visual aspects of form as such, and in making things appear to re-exist in drawings, persists in the case of children who have what is called special talent, but becomes secondary to practical interests in other cases.

A statement is often made by teachers of constructive work in high schools that children who come to their classes from elementary schools are usually unable to draw a piece of construction, either from the object or as an experimental sketch to show how a proposed object will appear, and cannot produce a representation that appears to be well constructed and to exist convincingly in three dimensions. In many schools the facts justify this criticism of the drawing. Most elementary courses in drawing undertake during the last two years, if not earlier, to teach the perspective of rectangular and curvilinear objects. A solution of the following problem will contribute to the effectiveness of such courses.

Problem II. In learning to represent constructed objects involving common geometric shapes, what is the specific contribution of each of the following methods?

- (a) Drawing directly from objects and making corrections on a basis of observation.
- (b) Theoretical study of perspective principles.
- (c) Developing concepts of solidity of such a sort that representations of constructed forms can be built up from imagination when the objects are not present.

An experiment bearing on point C was tried with a group of pupils of an eighth grade working one hour twice a week for a month. These children were asked at first to draw a book lying on a desk in front of them, and a chair standing at a little distance. In each case the book was represented insufficiently

foreshortened. In the words of the children, it did not lie flat enough. In the case of the chair, the large number of lines proved confusing.

The children were then given three structural lines of a rectangular solid (Fig. 1, a) and added the other visible edges, so they appeared to be consistent with these. They then experimented with forms constructed upon variations of the angle formed by 2 and 3 to discover the effect of modifications of this angle upon the apparent position of the object and the limit of variation beyond which it was impossible to produce the effect of a rectangular solid (Fig. 1, b). This experiment was followed by another drawing of a book. This later drawing indicated a marked increase of ability to represent the object as lying flat.

Two facts were concretely emphasized as a result of this work—first, that a determination of the direction of three converging edges of a rectangular solid decided the position in which the object would appear in the finished drawing; second, that the lines representing these three edges determined the direction of all the other lines. If the object appeared distorted, it was necessary only to discover what line failed to follow a direction apparently parallel to its key line and to change it so it should be consistent with that line.

Persistent practice in completing drawings of rectangular solids upon three given lines was necessary through portions of three periods in order to eliminate distortions, especially of the upper face. The pupils were led to regard the representation as a solid of wood, the edges of which they were to square to the given lines.

Later the completed drawings of solids were cut pictorially into various forms, the lines of section being suggested by chalk lines upon a box. Combinations of rectangular solids were also suggested and drawn (Fig. 2, a).

One pupil, slow in drawing, but quick in problems involving reasoning processes, was awakened to keen interest by the discovery that complex modifications of shape could be drawn with an absolute assurance that the resulting appearance would correctly represent the structure if the sequence of the first three key lines were consistently followed. His drawing from

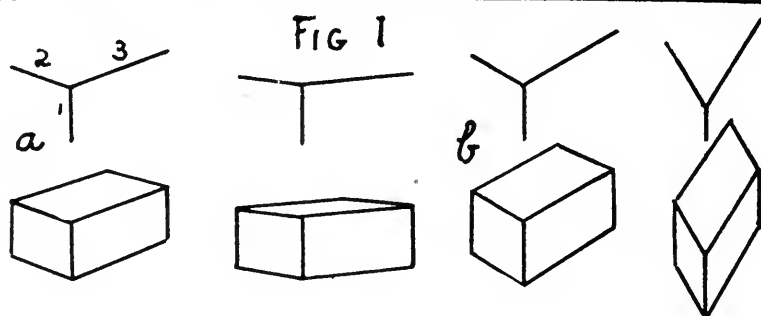
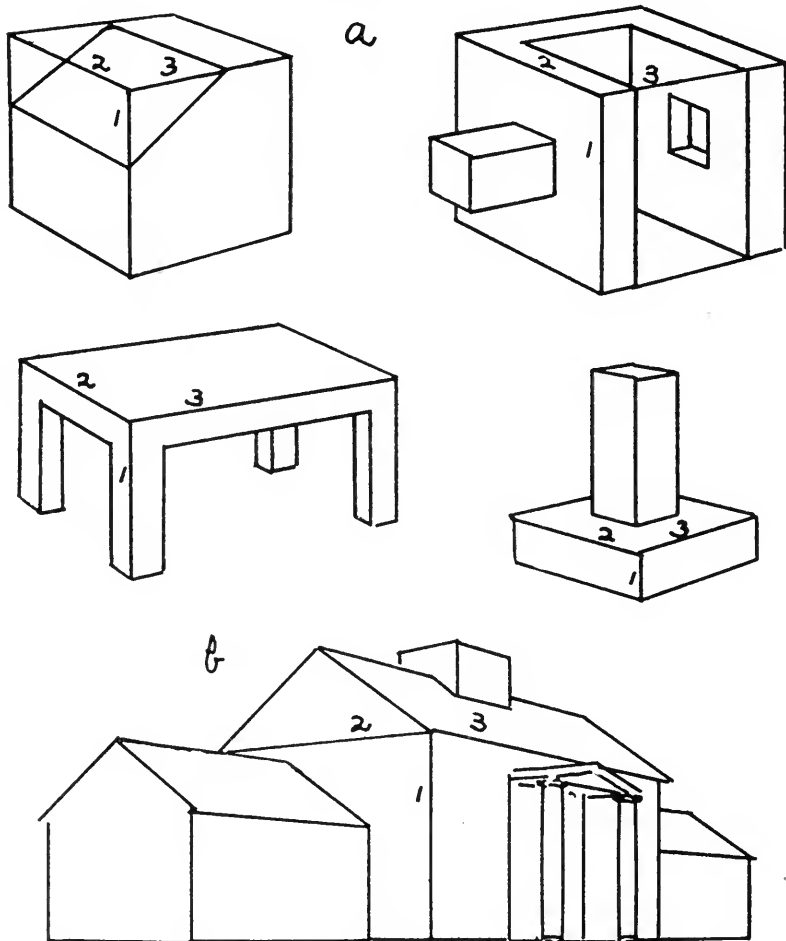


FIG 2.



imagination was thereafter usually confident and accurate, and to a great degree this was true of his drawing from objects.

Toward the end of the lessons, practice was given in relating to the three key lines the other outlines of a rectangular oblong with more deliberate care than at first, so that the resulting drawing was a completely satisfactory representation of rectangular faces at an angle. This was done with large figures on the board, as well as with smaller drawings on paper. The sole test as to correctness was in the visual satisfaction produced by the result. In drawings which met this test it was found by measurements that the apparently parallel outlines of retreating planes appeared to converge in the direction of their further ends. The difference between this method of approach to perspective effects by building up concepts of solidity and the teaching of formal perspective by means of reference to distant vanishing points theoretically computed and to the position of objects relative to the level of the eye will be at once apparent. It is based upon an increasing reliability of the testimony of the eye regarding impressions supplied to it directly from the object, because of a developed concept to which to refer them rather than upon an ability to compute results from ulterior data. Further experiments might show whether such computations are of most value as a means of checking up results after visual perceptions are sufficiently developed to be fairly trustworthy, or whether they should accompany and reinforce the method based on constructive imagination, or whether they demand a more mature form of mental activity which should be postponed to the high school.

It was found comparatively easy to pass to the construction in graphic terms of objects so large that, while the upper outline extending to the right or left appeared to slant downward, the lower line in the same sequence appeared to slant upward, thus necessitating a compromise in the case of intermediate lines (Fig. 2, b). The work upon this phase was brief, however, and carried on only with the two or three who completed the other drawings rapidly. At the close the pupils again drew a book and a chair.

The following results were apparent:

1. A definite method of procedure in drawing a rectangular solid; for example, in the case of the chair, a selection and

careful delineation of three or four controlling lines and the reference of all others to these.

2. Ability to judge readily regarding the correctness of a representation of a rectangular plane in a foreshortened position from the immediate visual impression before appealing to the intellectual verification of perspective theories.

3. Ability to draw with some degree of confidence from imagination somewhat complex combinations of rectangular solids, adding to the forms or modifying them by sections at will as a result of practice in thinking in three dimensions while expressing in terms of two.

Methods for testing the following problems will easily suggest themselves:

Problem III. Most children without outside suggestion tend to make from objects drawings smaller than those desired by the instructor, especially if the object is not of great size or is not in the immediate foreground.

Is there a psychological reason for the size of drawing which a child naturally makes if he follows his own tendencies, uninfluenced by outside suggestions, and does this size bear any definitely ascertainable relation to the size of the image produced upon the retina?

A standard for comparison in any given case may be found in the size which would result if a tracing of the object were made upon a plane between the eye and the object, so placed as to intersect the visual cone at right angles at the same distance from the eye as is the paper when the drawing is being made. Under these conditions if the paper, by a radius equal to its distance from the eye describes an arc from its position at the time the drawing was made to one between the eye and the object, it may there be made to coincide with the plane just referred to, and given points on the drawing, if it be correct, will intersect rays from corresponding points of the object to the eye.

In making a drawing which fulfils these dimensional conditions, no necessity arises for translating into a different visual scale the impression received from the object. This direct method of representation has been well described by Dr. Denman W. Ross of Harvard University as drawing "after the

manner of tracing." The method technically termed "blocking in," which consists in surveying and mapping out the structure of a drawing, so that the size, regardless of any relation to the dimensions of the visual image, shall suit a given space and conform to an arbitrarily imposed scale of size before details of representation are attempted involves more complex and indirect processes.

If experiments show that children tend naturally to approximate the scale of their drawing to that of the visual image, the "blocking in" method would seem to be more appropriate for advanced students than for beginners.

Problem IV. What particular habits of analysis of impressions are developed by making rapid sketches limited to a brief time as compared with those which come from making carefully-finished drawings, for which practically unlimited time is allowed? What should be the relation between these two methods? Does training in one give ability to perform the other? What additional forms of expression are developed by memory-drawing?

Problem V. What contribution does each of the following methods make toward promoting the ability of children in primary grades to draw?

- (a) Detailed observation of objects and comparison of the drawings with the object.
- (b) Study of pictures, including copying or tracing.
- (c) Modeling in plastic material.
- (d) Seeing a skilful draughtsman draw the object under consideration.
- (e) Memory-drawing.

A somewhat careful experiment along this line was carried on with his own child, of about eight years of age, by a graduate student of the School of Education, to determine, if possible, which of certain stimuli exerted the strongest influence upon his drawing. The boy first drew "out of his head" the following objects: a house, boat, bird, tree, horse, man, steamboat, delivery wagon, automobile. He next drew from particular examples of these objects; for instance, the house across the street, a toy boat, a stuffed bird, etc. Records were kept of the order of procedure and of the comments of the

child in six cases as a basis for more detailed comparison of the two ways of drawing.

The effect of different stimuli upon the representations of the same object was then tried in four cases. For instance, after the bird had been drawn from imagination and from the object, it was modeled from the object, and after the interval of a day drawn again. A drawing of the bird was made for the child. Later he copied and then traced and still later cut out with scissors a picture of that kind of bird. After each study a drawing was made from memory, and the items added by each step were noted.

Obviously, the study of a single case under special conditions offers little that is conclusive regarding regular school work. The following facts, however, are not without significance:

1. Of all the stimuli tested, seeing some one draw appeared to exert the strongest influence.
2. At this age observation of the object during the period of drawing appeared to play an unimportant part in influencing the result.
3. Modeling the object sometimes appeared to produce a definite retrogression in the drawing immediately following. This seemed to be due to the fact that in modeling an object, for example, a toy boat or a cart, the details, as masts, rudder, flag, wheels, etc., could not be represented in plastic material with the same freedom as with a pencil, and the impression left by the restriction of material was sufficiently persistent to be evident in the following drawing. This casts no reflections upon the educational value of modeling, but merely enforces the view that its chief value during primary years lies in the fact that it furnishes another method of analysis of material.

Some of the problems connected with drawing lend themselves to fairly complete solution by ordinary laboratory methods, as, for example, does Problem III of this article. Others offer the prospect of results less satisfactory to the investigator. Yet they are of importance in the teaching of the subject, and to the degree to which they can be submitted to critical study will the vagueness with which they are now surrounded be removed.

A TENTATIVE REVISION AND EXTENSION OF THE BINET-SIMON MEASURING SCALE OF INTELLIGENCE.

PART III. SUMMARY AND CRITICISMS.

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It is evident from the results of our investigation that the Binet scale requires a radical revision to make it at all suitable to conditions in this country. We wish to submit as a basis for further work the following series of tests, which is based chiefly upon the tables of results presented in the preceding articles of this series, but partly upon the results secured by Bobertag and by Binet in 1911. Although we realize that no series of tests can claim more than a rough approximation to accuracy until it has been given a painstaking try-out with many hundreds of children under widely-varying conditions of culture and training, we believe, nevertheless, that the series here offered will prove a more serviceable basis for further exploration than either the 1908 or 1911 series of Binet. *At the same time, the frankly tentative nature of our revision should be remembered.*

REVISED SCALE.

N. B.—Examiner should check all items separately.

YEAR III (unit value .1666).

1. a. "What's the thing to do when you feel sleepy?"
b. "What's the thing to do when you feel cold?"
(Both must be passed.)
2. Weights:—3-12 . . . 6-15 . . . 3-12. (Two out of three.)
3. Naming objects: key . . . closed knife . . . penny . . .
(no failure).
4. Knows sex.
5. Repeats three digits: 641 . . . 352 . . . 783 . . . (Two successes.)
6. Pictures (enumerates) 1 . . . 2 . . . 3 . . .

YEAR IV (unit value .2).

1. Copies square.
2. Counts four pennies.
3. Divided rectangle.
4. Chooses prettier: 1 . . . 2 . . . 3 . . . (must be no failure).
5. Defines (use): a table . . . a chair . . . a horse . . .
a manuma . . . (three out of four).

YEAR V (unit value .2).

1. Morning or afternoon.
2. Names colors: red . . . yellow . . . blue . . . green
. . . (no failure).
3. Puts key on chair, brings box, shuts door.
4. Vocabulary index (score?). (See third article of this series.)
5. Repeats: a. "We expect to have a great time down at the seashore."
b. "When the train passes, the engineer will blow the
whistle."
c. "Why should anyone want to harm a beautiful bird?"
(One success out of three.)

YEAR VI (unit value .1666).

1. Right hand, left ear.
2. Number of fingers.
3. Counts thirteen pennies.
4. Repeats: 4739 . . . 2854 . . . 7261 . . . (Two out of three.)
5. a. "What's the thing to do if it's raining when you start to school?"
b. "What's the thing to do if you have missed a train?"
c. "What's the thing to do if you find that your house is on fire?" (Two out of three.)
6. Vocabulary index 12 per cent. (2160).

YEAR VII (unit value .1666).

1. Copies diamond.
2. Omissions from pictures: 1 . . . 2 . . . 3 . . . 4 . . .
(Three out of four.)
3. Names: penny . . . nickel . . . dime . . . quarter . . .
(No failure.)
4. Pictures (describes): 1 . . . 2 . . . 3 . . . (Two out of three.)
5. Vocabulary index 14 per cent. (2520).
6. Repeats sentences 14 to 16 syllables:
a. "We will go out for a long walk. Please give me that pretty
straw hat."
b. "We are having a fine time. We found a mouse in the trap."
c. "Brother Frank had a fine time on his vacation. He went fishing every day." (One out of three.)

YEAR VIII (unit value .1666).

1. Writes from dictation: "The pretty little girl."
2. Compares: butterfly—fly; wood—glass; paper—cloth. (Two out of three.)
3. Counts 20 to 0 (twenty seconds).
4. Ball and field (score 2). (See third article in this series.)
5. Repeats: 31759 . . . 42385 . . . 98176 . . . (Two out of three.)
6. Vocabulary index 18 per cent. (3240).

YEAR IX (unit value .125).

1. Value of stamps: 111222.
2. Names date.
3. Reading for four memories. Time
4. Weights, 3—6—9—12—15. Trial 1 2 3
5. Fifty words in two minutes.
6. a. "What's the thing to do when you have been struck by a playmate who did not do it purposely?"
b. "What's the thing to do when you have broken something which does not belong to you?"
c. "What's the thing to do when you have been detained so that you are in danger of being late for school?" (Two successes out of three.)
7. Vocabulary index 23 per cent. (4140).
8. Completion test (score . . .). (See third article in this series.)

YEAR X (unit value .125).

1. Copies designs: 1 2 (See Binet 1911 series.)
2. Three words in one sentence.
3. Six digits: 374859 825746 762953 (Two out of three correct.)
4. Ball and field (score 3).
5. Vocabulary index 26 per cent. (4680).
6. Fables 1 2 3 4 (See second article in this series.)
7. Completion test (score 20).
8. Makes change (25c., 4c.).

YEAR XI (unit value .1666).

1. Arithmetical reasoning (score ?). (Using the following problems taken from Bonser's "Reasoning Ability of Children in the Fourth, Fifth and Sixth Grades," page 2. The child is given the problems in the following form, and is asked to write the answer after each problem, making no other figures:)
(a) If three-quarters of a gallon of oil costs 9 cents, what will 7 gallons cost?
(b) At 15 cents a yard, how much will 7 feet of cloth cost?
(c) A man whose salary is \$20 a week spends \$14 a week. In how many weeks can he save \$300?
(d) How many pencils can you buy for 50 cents at the rate of 2 for 5 cents?
(e) A man spent two-thirds of his money and had \$8 left. How much had he at first?
2. a. "What ought one to do before taking part in an important affair?"
b. "What ought you to say if someone asks your opinion about a person you only know a little?"
c. "Why ought we to judge a person more by his acts than by his words?"
d. "Why do we excuse a wrong act committed in anger more readily than a wrong act committed without anger?" (Three out of four correct.)
3. Vocabulary index 30 per cent. (5400).
4. Fables: 1 2 3 4
5. Completion test (score 25).
6. Sees the point in following samples of wit and humor. E reads each passage and asks S "What is the point of that joke?" "What is funny about that?" etc.

- (a) A man called at the postoffice to inquire if there was a letter for him. "What is your name?" said the postmaster? "Sure," said the man, "you'll find my name *on the back of the letter.*"
- (b) A woman was once told of a man who had twice had small-pox and had died of it. "Did he die the first time or the second?" the woman asked.
- (c) A young fellow who wanted to be witty once said to a barber, "Did you ever shave a monkey?" "Why, no, sir," said the barber; "but if you will please sit down, I will try."
- (d) A religious old lady used to say that God was very good to make the greatest rivers flow past the largest cities.
- (e) A peddler in his cart overtook another peddler on the road and thus addressed him, "Hallo, what do you carry?" "Drugs and medicines," the other replied. "Go ahead, then," said the first; "I carry gravestones."
(Three out of five satisfactory.)

YEAR XII (unit value .1666).

1. Absurdities, as follows:

- (a) An unfortunate bicycle rider broke his head from a fall and died instantly. He was picked up and carried to a hospital, and they do not think he will recover.
- (b) I have three brothers—Paul, Ernest and myself.
- (c) There was a railroad accident yesterday, but it was not serious. The number of dead is only 48.
- (d) Yesterday the police found the body of a young girl cut into 18 pieces. They believe that she killed herself.
- (e) The engineer said that the more cars he had on his train the faster he could go. (Four out of five correct.)

2. Disarranged sentences: 1 . . . 2 . . . 3 . . .

3. Reading for seven memories . . . (Time . . .)

4. Suggestion. (See Binet, 1911.)

5. Vocabulary index 36 per cent. (6480).

6. Repeats 26 syllables (one out of three correct).

- a. "My little children, you must work very hard for a living. You must go every morning to your school."
- b. "The other day I saw in the street a pretty yellow dog. Little Bessie has spots on her new apron."
- c. "Ernest is often punished for his bad conduct. I bought at the store a pretty doll for my little sister."

YEAR XIII (unit value .1666).

1. Seven digits: 2183439 . . . 9728475 . . . 3247196 . . .
(Two out of three correct.)

2. Vocabulary index 42 per cent. (7560).

3. Fables: 1 . . . 2 . . . 3 . . . 4 . . .

4. Arithmetical reasoning (score? . . .).

5. Completion test (score 36).

6. Problems of fact, as follows (two out of three):

- (a) My neighbor has been having queer visitors—first a doctor, then a lawyer, then a priest. What's happening at my neighbor's?
- (b) An Indian coming to town for the first time watched a white man riding along the street. As the white man rode by, the Indian said: "White man lazy: him walk sitting down." What was the white man sitting on?

- (c) A man who was walking in the woods near a city stopped suddenly, very much frightened, and ran to the nearest policeman, saying that he had just seen, hanging from the limb of a tree, a ———.

YEAR XV (unit value .1666).

1. Fables (score ? . . .).
2. Changes hands of clock (4 minutes to 3 o'clock). (Must be able to recognize the slight discrepancy).
3. Pictures (interprets) 1 . . . 2 . . . 3 . . . (Two out of three.)
4. Vocabulary index (score ? . . .).
5. Completion test (score ? . . .).
6. Uses code (See Goddard's article, "The Training School," May, 1911).

ADULT.

1. Reversed triangle.
2. President and King. (See Goddard's article cited above.)
3. Ball and field (score 4, with conditions stated).
4. Completion test (score ? . . .).
5. Gives sense of selection (see Binet, 1911).

"One hears very different judgments about the value of life. Some say it is good; others say it is bad. It would be more correct to say that it is mediocre, because, on the one hand, it brings us less happiness than we want, while, on the other hand, the misfortunes it brings are less than others wish for us. It is the mediocrity of life that makes it endurable, or, still more, that keeps it from being positively unjust."

Some of the Binet tests which we found were especially dependent on training, and which came at years already crowded with more suitable tests were omitted. Reading for two memories, 8th year, was omitted because but 65 per cent. passed it with no time limit; furthermore, the difficulty here was not one of memory, but of the mechanics of reading, which is purely a matter of training. Definitions of abstract terms in the eleventh year and differences in meaning of abstract terms in the thirteenth year did not give satisfactory results at any age, and furthermore, the vocabulary test is of much greater value and can replace them. Questions of comprehension in Binet's fifth year we would place before the fourth year. This test probably belongs in the third year.

In general, we have considered that two-thirds of the children of any age ought to pass a test to make the test characteristic of that age. Where the number passing at a given year is just at or below two-thirds and the following year there was a growth in ability, we have ordinarily fixed on the latter year as the more characteristic. Where for two or three years

there is but little change in ability we have generally chosen the earlier of these years as characteristic, even though not quite two-thirds passed, especially when there had been a sharp rise in ability from the year before. In two or three instances we have placed a test where less than 60 per cent. passed; once where it seemed our method of applying the test had been at fault, and in two other cases where our data were rather limited and we believed that the particular group in question had suffered some slight adverse selection.

The above tentative revision has made the lower end of the scale more difficult by setting back many of the tests of Binet's higher years, and the upper range has been supplemented, rearranged, and some of the tests even discarded. As no three-year children were included in our tests, we cannot offer our third and fourth-year tests with assurance that they are all correctly placed; it is possible that three-year-olds would pass some of the fourth-year tests. We are sure that normal four-year-olds can pass them, and that they do not belong to later years, where many of them were placed by Binet.

Believing that tests of memory, vocabulary, observation, reasoning and reaction to a complex social or moral situation bring out fundamental characteristics of mental ability, we have given a well-scattered range of tests on memory, questions of comprehension, reasoning, tests involving observation, linguistic invention and association (such as the completion test and rearranging a sentence of mixed words, vocabulary, etc.), so that a child of any age will be tested on a number of these important questions. Especially satisfactory also are such tests as description of pictures, omissions from pictures, aesthetic judgment, comparison of things from memory and the naming of words. They depend relatively little on formal training, can be arranged to show definite progress and require responses to complex situations that bring out what we really desire to get at. Tests of comprehension, vocabulary, practical judgment and ability to generalize seem especially desirable. The naming of words is interesting in that it brings out the difference between the type of mind that thinks only in terms of concrete, present objects and the mind that can deal with things not present. One S names objects which he sees

lying about the room; another names things from his past experience and according to logical sequence. This test also throws light upon the S's mental self-control. One child plunges in so precipitously that his stock of thoughts is exhausted in a half minute, and he is unable to collect himself again; another starts in calmly, maintains his composure all through the test and makes a very creditable record.

A detailed criticism of the individual tests is reserved until data shall have been secured from the application of the revised scale upon about 1000 non-selected children. This work, made possible by the kind co-operation of several psychologists in various parts of the country, is now in progress.

In this connection it may be said that the tests in general are significant not so much for displaying the child's intelligence in its entirety as for detecting that type of mind which is not capable of profiting from its social environment. A failure on any one of these tests has but little significance, but if a child of 12 or 14, or even younger (as we have found in several cases), is unable to name the months, make change, remember five digits, define better than by use or read a simple selection and give two memories, these facts collectively show that something is lacking in his mental make-up, and often give clues as to the source of trouble. This is illustrated by Fig. II, in which the central line represents age norms on the scale and each of the various crosses to the left the starting point for a serially-graded test. The figure pictures the results secured by applying the test to a 12-year-old who is two years retarded in every respect, the dotted lines extending to the age norm which ought to be reached, the unbroken line to the age norm which is actually attained. The unbroken lines will not usually cross the central line at the same point, but when they show similar divergent tendencies from their dotted companions, the presumption is very strong that we are dealing with a case of greater or less mental deficiency. If thorough investigation of the pupil's home life, health record and educational advantages discloses no sufficient cause for the retardation, the presumption becomes very strong, indeed. There is, however, still the possibility that the condition may be one of temporary retardation rather than of permanent

deficiency. The pupil may be only 10 years old physiologically, though 12 chronologically, and if so, the prognosis is not necessarily unfavorable. In such a case the pupil may finally attain a normal, if late, maturity.

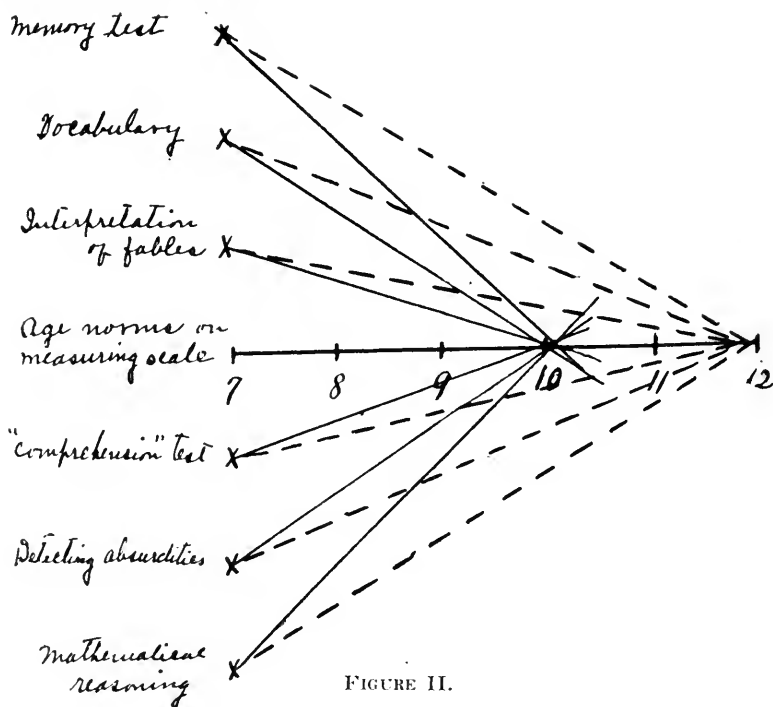


FIGURE II.

In order to make the tests of the greatest practical use, it may prove desirable to apply along with the measuring scale of intelligence the newly-developed tests of physiological age. Unless this is done, it is conceivable that some children will be misjudged as to native ability, a mistake which in individual cases might have very serious consequences. In justice to the child the normality of whose intelligence has been questioned, tests for physiological age should always be applied before institutional treatment is recommended, and perhaps occasionally after commitment.

Another important means of rendering the diagnosis more certain would be to apply tests of ability to learn. If 100 14-year-old boys are running the mile race, their relative posi-

tions at the end of two minutes are not a reliable indication of their individual differences in native ability to run. Some may be crippled, some fatigued from previous exertion, some in training, some raw. If all were put through a standard course of training of sufficient length and under controlled conditions, the differences still remaining would represent, approximately, their difference in endowment in this capacity. We have no standardized norms of ability to learn, except the rough ones offered by a graded school curriculum. Failure to meet the school standard satisfactorily creates a suspicion of sub-normality, and usually not unjustly. But experience proves that this test is not wholly reliable. Some children fail to progress in school for other reasons than real inability to learn. We are in urgent need of supplementary tests of learning ability of such a nature that they will not fail to enlist the child's greatest effort.

ASSIGNING CREDIT.

Binet's original method of assigning credit was faulty in not giving equal value to the different year groups. The method he proposes in the 1911 article avoids this difficulty by equalizing the number of tests for the different years. This arbitrary limitation of the number of tests per year is, however, an unnecessary stricture. We submit another plan, which avoids the difficulty above mentioned; which gives credit for every test passed, discarding no results because they are only a fractional part of the year or half-year unit; which gives partial credit where it seems to be deserved, and which gives a final result more convenient for statistical treatment.

Inasmuch as the number of tests in each year is not the same, no one number has any special value over any other as a unit of value for a year group. Whatever number may be chosen as the year unit, it should be divided by the number of tests in any year to determine the unit value of each test of that year. For sake of convenience, we suggest that 1 be taken as the value of any year group. Accordingly, dividing 1 by the number of tests in any year gives us the unit value of each test in that year. In reckoning an S's total performance add

in, at its unit value, each test passed and add .5 or a half year. (The necessity for adding a half year's credit is due to the method of age grouping which has been employed, and has been explained in full on page 68 of the February number.) In reckoning we count from the first year instead of from the third, disregarding the fact that tests for one and two years have not been agreed upon. To illustrate the procedure, let us suppose that an S has passed tests the sum total of whose value is 8.2. Add the value of half a year and we have 8.7, or a test age for this S of 8.7 years. Half credit may be allowed where the performance seems to make it desirable.

An S should be required to begin as low in the scale as necessary to insure that he is not given credit for what he cannot do, but, of course, should be given full credit below the point where he is started, counting the first and second years. The tests should always continue until there is not even a remote possibility of the S winning further credit. Where these rules regarding desirable range of testing are not observed we can never be sure of the reliability of the norms so established. To make such a thorough-going try-out requires much time and patience. We would repeat that wholesale application of the tests, using but a few minutes of time and a range of but two or three year-groups for each child, can never give us the standard norms we need, and will only serve in the end to bring discredit upon all efforts in this important field.

In spite of the numerous imperfections and inadequacies of the Binet scale above mentioned, our experience in the work of applying it has given us a most favorable opinion of the practical value of such a series when it has been refined and extended, an impression which grows upon us as the work continues. By its use it is possible for the clinical psychologist to submit, after a 40-minute diagnostication, a more reliable estimate of a child's intelligence in relation to normal children of his age than most teachers can offer after a year of daily contact. Since all human estimations are relative to some standard, the teacher has no means of discovering whether her class on the whole is above or below the normal for the corresponding age. Her standard may be too high or too low, vague, mechanical or fragmentary. We venture

the prediction that before many years it will become a matter of course to apply serial mental tests in the public schools to all pupils who are retarded, or about to become retarded, or who give indication of unusual ability. In New Jersey a recent State law makes the application of tests of mentality mandatory in the case of all school children retarded as much as three years.

The scientific management of special classes for atypical children in the public schools will be impossible until similar series of tests are multiplied indefinitely. To ascertain the full extent and qualitative nature of a case of mental retardation, together with its causes, is extremely difficult. In fact, with existent methods it is hardly possible at all. Our treatment of such cases barely transcends guesswork. May we not hope that 10 or 15 test scales will soon be devised, each more perfect than the Binet series, which, collectively, will enable the clinical psychologist in a few days to lay bare the "natural history" of a child's development; tests which will explore every line of efficiency, intellectual, volitional, motor, personal, pedagogical, social, linguistic, etc., and which will relate all these at every point to individual peculiarities of instincts and interests and to all significant incidents of his experience? Now that the individual treatment of pupils in the schools has begun, there is no stopping short of this ideal. Tests must be developed which will enable us to differentiate all degrees of intellectual ability and all kinds of intellectual unevenness; others which will mark for special educational effort the pupil whose emotional equipment and volitional tendencies threaten the onset of criminality, insanity, hysteria, neurasthenia, or other of the neuroses. With the accumulation of positive experimental data on so many aspects of individual mentality, it would seem that John Stuart Mill's suggestion looking toward a science of human character, *ethology*, as he called it, is on the verge of realization. The modern studies in the psychology of testimony, suggestibility, measurements of mental growth, super- and sub-normality, submerged complexes, emotivity, psycho-analysis and association reactions offer in addition many other fascinating fields for the genetic study of personality.

A word may be added respecting criticisms which have been offered to the effect that mental tests, being only measures of a product, can have no value for psychology. This, of course, is the extreme point of view of the uncompromising structural psychologist who limits by definition the legitimate scope of the science to the study of the content of consciousness. We prefer, however, to conceive of psychology in the broadest sense as the science of behavior. In so far as the structural elements shed light upon function they are significant, but we believe they can no more usurp the entire domain of psychology than the chemistry of the bones and muscles can swallow up or displace the science of physiology.

SUGGESTIONS FOR FURTHER DEVELOPMENT.

We have considered our study only a brief preliminary step in surveying the intellectual capacities of normal children. If our tentative revision of Binet's scale has sufficient value, it should be subjected to a thorough trial upon thousands of representative children. At the same time, numerous supplementary tests should be subjected to experiment, for it cannot be supposed that the tests thus far hit upon even approach perfection. There are also wide gaps in the series where tests need to be supplied. It is especially desirable that age norms be secured for tests of the general nature of some of those used by Healy and Fernald in the Chicago Juvenile Court.

If possible, norms for many tests should be established beyond the thirteenth or fourteenth years, though the difficulties here are very serious. At this time sex differences, and probably also physiological age differences in the same sex, become much more prominent. Perhaps from the twelfth or thirteenth year it will be found necessary for practical purposes to divide the scale into two branches, one for girls, the other for boys. Even this bifurcated scale would have little value unless correlated with scales of physiological age. Again, in this range, emotional disturbances come in to invalidate our norms of intellectual performance. The sex interest, emotional control, religious upheavals, vocational

yearnings, all these and many other adolescent phenomena are sure to complicate the activities of the intellectual functions. Still another difficulty in obtaining norms above 13 years is the fact that the public school, the only place where extensive experiments of this nature can be carried on, does not hold all the pupils beyond the fourteenth birthday. Where compulsory school laws actually keep all pupils in school till the fifteenth birthday, norms can be secured for 14 years, provided care is taken to get representative 14-year-olds. This cannot be done if only 14-year-old children who have not progressed to the high school are included.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

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EDITORIALS.

President W. J. Hawkins of the Warrensburg (Missouri) Normal School has placed himself on record as favoring an emphasis of educational research in the normal schools. In the April number of the *Western Journal of Education* he says:

EDUCATIONAL RESEARCH IN NORMAL SCHOOLS. Research work can alone solve the problems in education. It is being done by the schools of education in the universities. These schools of education are grappling with the real problems in education and life that the normal schools have left wholly untouched.

It is my contention that the normal schools are now prepared to enter, and should enter this field of work. They have in their faculties men and women who are capable of undertaking such work. The states can devote the public funds to no purpose that more directly concerns the people. Everyone engaged directly or indirectly in the elementary or the secondary schools knows that much of the work is merely "marking time." * * * Educators know that there is great waste. * * * The results are deplored and criticized. The people do not know the remedy. Educators are expected to know it, but they do not. They are getting anxious to find out. The people are pushing them on to find out.

* * * To my mind, such an enlargement of the services of the state normal school is not only a possibility, but an obligation.

It is our sober conviction that President Hawkins' proposal represents an ideal that will infuse new life into the normal schools and gradually bring them to the position that they should occupy in our system of public education. We urge a more liberal financial support of normal schools for many reasons, but for none more important than that they may turn some of their available talent into the field of investigation. What can be done by a liberal infusion of the spirit of research has been abundantly demonstrated by the success of the agricultural experiment stations. Fifteen thousand dollars appropriated annually from the Federal treasury to each of the state normal schools for purposes of educational investigation would work a miracle in less than a generation. W. C. B.

Those who attempt to defend the study of Latin in secondary schools by an ill-tempered, fanatical and irrational abuse of college professors of education (in whom, it would seem, the crime of *lese majeste* is now concentrated) would do well to study rather carefully Dr. S. P. Sherman's article, "English and the Latin Question," in the April number of *School and Home Education*. Dr. Sherman wastes neither time, energy, nor printer's ink in personal vituperation. He does not presume to call into question the experimental evidence against the validity of the dogma of formal discipline in its older form. Himself both a classical scholar and a teacher of English, he limits his remarks to a field with which he is thoroughly familiar, and in which he can speak with authority. And when he asserts that a man may as well "try to reach England without a boat as to attain proficiency in English without Latin," his statement challenges attention. But he goes beyond the mere statement: he adduces experimental evidence in its support. His colleagues who will have no commerce with the experimental method in education will doubtless brand him as an apostate. Shorey will sneer and Fite will snort; but some of the less hardened may conclude that, after all, hard facts are the most effective weapons to employ when the efficiency of one's work is being questioned; and that the best way to hammer a belief into a fact is to use a sledge of unprejudiced induction and an anvil of controlled observation. W. C. B.

The movement for the establishment of special classes for children of superior ability continues to make headway, though but slowly.

SPECIAL CLASSES FOR GIFTED CHILDREN. Harrisburg, Pennsylvania, a city equipped with a nine-year elementary course, found several years ago that, while the nine-year

course presented certain advantages for the average child, there were opportunities, particularly in the second and the sixth grades, for bright children to skip grades or to do two years' work in one. By dint of extra work on the part of teachers and pupils, large numbers of bright children were promoted more rapidly than the average pupils. A recent reconstruction of the course of study, however, increased the difficulty of the work in the second and sixth grades and led to the abandonment of the fast sections in these years. To restore the opportunity for advancement to gifted pupils, Superintendent Downes arranged for the establishment in 1910 of two and in 1911 of three "special schools,"¹ much after the pattern of the "preparatory centers" in vogue at Baltimore, Worcester and Indianapolis. The results have been most gratifying, whether the performance of these classes is measured in terms of attendance, discipline or scholarship. It was found that in the high school the pupils whose stay in the grades had been thus shortened showed no inadequacy of preparation. Superior ability and special training more than made up for the loss of a year of drill and for the lesser maturity of the pupils.

In 1910, also, Principal W. C. Washburn of Cincinnati, Ohio, tried the experiment of segregating bright children in the lower grades. Some 30 pupils taken from the third, fourth and fifth grades were placed under a teacher competent to meet their needs. The selection of the teachers proved in three instances to have been erroneous and these children were returned to the regular grades; the remainder of the class will complete two grades in one year. In the opinion of Principal Washburn this experiment in early segregation has demonstrated its value, not alone in the saving of time, but in the spirit of self-reliance, self-activity and self-examination developed in the pupils. "I have never witnessed," says Mr. Washburn, "such orderly, intelligent work or felt such an atmosphere of joyful industry."

¹For details the reader may consult a forthcoming article by Superintendent Downes in the *Psychological Clinic*.

We cite these two instances of the establishment of special classes for gifted children because the outcome coincides so exactly with the outcome in other cities where the plan has been tried. They add to the previously available factual evidence which has always corroborated the theoretically obvious conclusion that the needs of gifted children cannot be adequately met by devices for flexible promotion, however ingenious these may be. The Cincinnati demonstration, furthermore, raises the query whether the segregation of gifted children ought not to begin early in the grades and continue throughout the elementary school.

G. M. W.

The present strong movement in the organization of public school music raises many psychological problems which may be solved by experiment in the educational psychology of music. Among them are the following: (1) **SINGING IN THE PUBLIC SCHOOLS.** What shall be the nature of the first approach to musical training in the grades? Music supervisors and teachers are divided into three camps on this question. One wing advocates technical training in sight-singing from the very start; another wing advocates that the training in the first two or three years shall be confined essentially to song appreciation, both hearing and singing of good songs; while the main body of teachers hold middle ground and make a compromise. (2) To what extent shall sight-singing exercises be varied by enriching associations, *e. g.*, by writing notes seen, named or heard? Here again the leaders in public school music are divided into three camps. One extreme wing holds that only that set of associations which is actually to be used by children throughout the course should be practiced, *i. e.*, singing from the printed staff; the other extreme would have us multiply associations, *e. g.*, by writing from dictation, composing and transposing; between these two extremes many, of course, find it easy to hold middle ground. (3) Should all public school children be required to sing? Musicians are the first and most pronounced in recognizing limitations and great diversities in musical ability. Yet we have the strange spectacle today of seeing singing made compulsory, regardless of natural ability and regardless of fitness for promotion on the basis of singing or hearing music. (4) Should music in the grades be taught by each teacher in her own room or by selected teachers? On this point the teachers of

music are about equally divided for and against the assigning of music to those teachers in a grade building who have the best natural ability as leaders in singing.

These are all questions about fundamentals. It is pitiful to watch the expensive attempt of this nation to settle such questions by the blind trial and error method. It is characteristic of educational waste. Such questions are readily reducible to controlled experimental conditions, and may be settled in a scientific way with enormous saving of money and mental energy. In some cases the psychological facts are already at hand, *e. g.*, as regards individual differences, and it remains only to bring the facts to bear in the normal schools and in the school systems. Some central agency, or some endowed fund, should be devoted to the scientific solution of these problems by systematic and thorough series of experiments and interpretation in the light of the known facts about the learning process. The solution is probably not single or simple in any case. Inquiry would reveal other and perhaps more significant problems. But only in this way can we lay a rational foundation for our aims and ideals in the teaching of this art. C. E. S.

The announcement by Dean Sumner that the clergy of the Protestant Episcopal Cathedral of Saints Peter and Paul, Chicago, will hereafter refuse to perform the marriage service unless each of the contracting parties presents a certificate of health from a reputable physician is an interesting step in the direction of practical eugenics, and has aroused a great deal of comment in the daily press. It has long been recognized in medical circles that such a requirement was needed to protect the innocent from suffering for the sins of the guilty. Whether the stand taken by a single institution will be of great avail against sentimental prejudices regarding personal liberty is an open question. The claim is made by some that the only guarantee of protection is to be found in legal enactment. But such enactment can only result from popular conviction, and perhaps one of the chief benefits of Dean Sumner's action will be to raise the question for popular consideration and discussion. J. C. B.

NOTES AND NEWS.

There is announced for publication this summer the first annual volume of *L'Année Pédagogique*, by MM. L. Cellerier and L. Dugas (Paris, F. Alcan). The aim is to present a general review of the progress of educational science.

A benefactor of Cambridge University (England) has contributed \$100,000 to found a new chair, to be known as the Balfour Professorship of Genetics. The donor also offers to build and equip a small station at Cambridge for the use of the professor, if this action should give the greatest promise for the advancement of research in genetics.

The daily press has been exploiting a couple of items of the "important, if true" variety, which should interest educational psychologists. The first reports that the director of the surgical clinic of Leipsic University "planted a piece of the thyroid gland taken from a healthy child into the *liver* of an imbecile child, who immediately afterward began to improve in intelligence, which increased until a complete cure was effected." The second reports that Professor Svante Arrhenius, at Stockholm, placed two groups of children of the same ages, and equivalent physical and mental ability in two classrooms, alike save that imbedded in the walls of the one were concealed wires carrying a high tension alternating current. The children who worked in the magnetic field, though it was unknown to themselves or their teachers, showed the effects at the end of a few weeks by growing on the average at a rate nearly double that of the children of the unmagnetized room and by surpassing them in grade of school performance.

The Trustees of the Peabody Education Fund, in closing the trust, announced some months ago that they would set aside for the endowment of the George Peabody College for Teachers the sum of \$500,000, in addition to the \$1,000,000 already devoted to this purpose, provided that the college raise a further sum of \$1,000,000 before November 1, 1913. It is announced that \$100,000 of this amount has already been contributed by Mr. J. P. Morgan.

The Music Supervisors' National Conference was held in St. Louis, Mo., March 19 to 22, Prof. C. A. Fullerton in the chair. The report of progress in public school music was gratifying. Nearly all the discussions took a decidedly psychological turn.

At the Cornell University Summer Session the work in psychology and education will be conducted by Professors DeGarmo and Whipple, Professor Baird of Clark University, Superintendent Elson of Cleveland and Superintendent Boynton of Ithaca, with the assistance of several instructors. Professor DeGarmo offers courses in the principles of education and the history of education, Professor Whipple in educational psychology, school hygiene, and mental and physical tests of school children; Professor Baird in introductory psychology, advanced psychology, introductory laboratory course, and the psychology of memory, imagination, learning and reasoning; Superintendent Elson in school organization, administration, supervision and management, and Superintendent Boynton in elementary education, with observation work in the East Hill School at Ithaca. Other closely related courses deal with the psychological basis of music, physical education, industrial education and the teaching of English, Latin, mathematics, physics, music, biology, geography, geology and drawing.

In the Harvard Summer School, July 2 to August 13, Prof. Ernest C. Moore of Yale University will give courses in principles of education and in school administration; Prof. Robert M. Yerkes of Harvard and Dr. Daniel W. LaRue of Stroudsburg Normal School will conduct courses in descriptive and in educational psychology, and Dr. William Healy, Director of the Juvenile Psychopathic Institute, Chicago, will offer a course on "The Psychology and Practical Training of the Mentally and Morally Abnormal, with special reference to Children."

Among the visiting instructors at the Dartmouth Summer School will be Prof. Melbourne Stuart Read of Colgate University, who will give courses in educational psychology, history of education and philosophy of education; Superintendent George Herbert Whitcer of Berlin, N. H., whose courses include child development and problems of secondary education; Superintendent Clarence E. Meleney of New York City, who will offer courses in principles of teaching in the elementary school and in school organization, and

Superintendent Edward L. Stevens of New York City, who will discuss the principles, organization and management of secondary schools.

At the University of Pittsburgh Dean Will Grant Chambers, Prof. Charles B. Robertson, Prof. Henry D. Sheldon, Prof. J. E. Wallace Wallin and their assistants are offering a large and varied list of courses in psychology and education during the summer term.

A special feature of the summer session of New York University will be the group of courses in the administration of recreation facilities under the direction of Mr. Lee F. Hanmer of the Russell Sage Foundation. With the rapid development of public playgrounds, recreation centers, city departments of recreation, vocation schools and social centers the efficient administration of recreation agencies becomes no small problem. The courses are designed to bring before school and civic recreation administrators the best and most approved forms of organization, promotion and administration of such agencies. Mr. Hanmer will be assisted in these courses by Mr. Clarence A. Perry of the Russell Sage Foundation, author of "Wider Use of the School Plant," and by Mr. William R. Harper, director of games and athletics, Brooklyn Training School for Teachers. Dr. Leonard P. Ayres, also of the Russell Sage Foundation, will give courses in the theory and practice of the measurement of educational processes and products.

The School of Education of the University of Pittsburgh announces for the spring term two new courses by Dr. J. E. W. Wallin, one on Clinical Psychology and the Study of Exceptional Children, and the other on The Care, Training and Education of Exceptional Children. Dr. Wallin will also direct a psychological clinic for the training of teachers of exceptional children.

The tenth annual meeting of the Brown University Teachers' Association was held at Providence, R. I., March 29 and 30. On Friday afternoon papers were read by Alfred E. Stearns, principal of Phillips Academy, on Moral Standards in the Schools; by F. S. Luther, president of Trinity College, on Moral Standards in the Colleges, and by Superintendent Arthur D. Call of Hartford, Conn., on The Growth of the Moral Life. The Saturday morning session was devoted to a discussion of incentives to study, following papers

by Prof. S. S. Colvin of the University of Illinois on Marks and the Marking System as an Incentive; by Superintendent R. T. Condon of Providence on Practical Efficiency as an Incentive, and by John B. Diman, headmaster of St. George's School, Middletown, R. I., on The Ideal as an Incentive. The annual dinner of the association, which was held in the Lyman Gymnasium on Friday evening, proved a most enjoyable occasion. The toastmaster, Professor Harkness, presented President Faunce and Professors Mead, Everett and Bronson of the University, who dwelt informally upon Alluring By-Paths for the Teacher, as exemplified in biology, philosophy and literature.

The conference on the conservation of school children, held at Lehigh University during the first week in April, under the auspices of the American Academy of Medicine, was largely attended by physicians and educators. Sessions were devoted to the following subjects: "Deficient and Backward Children," "Conservation of School Children," "Teaching Hygiene," and "Medical Inspection."

The Michigan Schoolmasters' Club held its forty-seventh annual session at Ann Arbor, March 26-30. Among the speakers were Prof. C. J. Keyser of Columbia, Dr. James F. Hosie, Chicago Teachers' College, President David Felmley, Illinois State Normal University, and Miss Sarah L. Arnold, dean of Simmons College, Boston.

Prof. W. H. D. Rouse of the Perse School, Cambridge, England, will offer courses at the summer session of Teachers' College, Columbia, on the oral or direct method of teaching Latin. This method involves the use of Latin in the classroom as a means of expression from the beginning.

At Teachers College, Columbia, Prof. E. L. Thorndike has secured leave of absence during the first semester of next year, and Prof. Paul Monroe during the second semester.

On the nomination of the Prussian Ministry of Public Instruction, Felix Krueger, Ph.D., professor of psychology at the University of Halle, has been appointed Kaiser Wilhelm professor at Columbia University for the academic year 1912-13. Professor Krueger will be in residence from September, 1912, until February, 1913.

Dr. Adolf Meyer, professor of psychiatry in the Johns Hopkins Medical School, sailed on March 16 for Switzerland.—*Science*.

Professor Guy Montrose Whipple of Cornell University recently gave a lecture before the Salem (Mass.) State Normal School on "The Supernormal Child," and another before the "Saturday Night Club," at Springfield, Mass., on "Recent Applications of Psychology to Law, Medicine, Education and Business Life."

Prof. Maurice A. Bigelow of Teachers College, Columbia, will give courses in biology at the summer session of the University of California.

W. C. Ruediger, professor of educational psychology in the Teachers College of the George Washington University, will give courses in education in the Summer School of West Virginia University, June 24 to August 23.

Superintendent Stratton D. Brooks of Boston, formerly professor of education at the University of Illinois, has been elected president of the University of Oklahoma. President Brooks will assume his new duties on May 1.

Dr. A. H. Yoder, formerly superintendent of the Tacoma (Wash.) schools, and more recently connected with the New York School of Philanthropy, has been elected president of the Whitewater (Wis.) State Normal School.—*Western Journal of Education*.

Dr. Lewis M. Terman, assistant professor of education, Stanford University, has been promoted to associate professor in that institution. Dr. Terman will offer two courses at the coming summer session of the University of Washington, Seattle, Wash., one on "The Hygiene of Education," and the other on "Problems of Experimental Pedagogy." Mr. J. B. Sears has been promoted from instructor to assistant professor of education in Stanford University.

Dr. W. H. Pyle has been promoted from instructor to assistant professor of educational psychology in the University of Missouri.

David Spence Hill, Ph.D., professor-elect of psychology and education of the University of Tennessee, resigned last fall to accept a chair of similar title in Tulane University of Louisiana. Dr. Hill is also serving as acting director of the School of Education, H. Sophie Newcomb Memorial College, the women's department of Tulane University.

PUBLICATIONS RECEIVED TO APRIL 1, 1912.

(Notice in this section does not preclude a more extended review.)

ARNOLD BENNETT. *Mental Efficiency, and Other Hints to Men and Women*. New York: George H. Doran Company, 1911. Pp. 119. 75 cents net.

Another popular book of the familiar "how to be successful" type, treating of mental efficiency, settling down in life, marriage, books, success, the secret of content, etc. We note that "mental calisthenics" are advocated as seriously as if no psychologist had ever studied the dogma of formal discipline.

H. M. BERNARD. *Some Neglected Factors in Evolution*. New York: G. P. Putnam's Sons, 1911. Pp. xxi, 489. \$2.60 net.

This highly original book is the result of a life-time spent in careful study of the finer structures of living organisms. The author, a former pupil of Haeckel and a well-trained biologist, was led by his comparative studies on the retina to reject the commonly accepted view that the cell is the fundamental unit of living tissues, and to look for a simpler and more primitive unit. This he finds in the proto-mitotic network, composed of particles of chromatin arranged on a network of linin filaments. The cell is but an aggregation of these proto-mitotic units, and the whole body is an aggregate of a higher order. The author finds that his theory clears up many obscure phases of evolution, and is in accord with the most recent researches in genetics. He is able to reconcile the neurone theory of the structure of the nervous system with the discoveries by Bethe, Apathy and others of fibrillar interconnections between neurones. It is a book that must be read and pondered by all students of evolution.

WALTER S. CORNELL, M.D. *Health and Medical Inspection of School Children*. Philadelphia: F. A. Davis Company, 1912. Pp. xiv, 614.

A valuable contribution to the literature of school hygiene. To be reviewed.

B. M. DAVIS. *Agricultural Education in the Public Schools*. With an Introduction by C. H. Judd. Chicago: The University of Chicago Press, 1912. Pp. viii, 163.

This is a study of the development of agricultural education, "with particular reference to the agencies concerned." Separate

chapters are given to the Federal Department of Agriculture and Bureau of Education; to the State departments of education and State legislation; to the agricultural colleges and their various plans for extension work; to the State normal schools and the various educational associations; to educational periodicals, farmers' institutes, agricultural societies and boys' agricultural clubs; to courses offered in elementary and secondary schools, and to textbooks in agriculture. An annotated bibliography concludes the volume. The book will be of great value to the student of vocational education.

KNIGHT DUNLAP. *A System of Psychology*. New York: Charles Scribner's Sons, 1912. Pp. 368.

To be reviewed.

THEODORE FLOURNOY. *Spiritism and Psychology*. New York: Harper & Brothers, 1911. Pp. 353. \$2.00 net.

"It is sympathetic, yet critical. While the author accepts the reality of telepathy, clairvoyance, telekinesis, materialization and many remarkable phenomena which apparently occur within the depths of the subconscious mind, it is, nevertheless, critical in tone, and he does not accept the doctrine of spiritism."

CHARLES HUGHES JOHNSTON, PH.D., Editor. *High School Education: Professional Treatments of the Administrative, Supervisory and Specifically Pedagogical Functions of Secondary Education, with Special Reference to American Conditions*. New York: Charles Scribner's Sons, 1912. Pp. xxii, 555. \$1.50.

The plan is to bring together in one volume a discussion, prepared by a number of specialists, of the problems presented in the teaching of the several subjects of the high-school curriculum. Further notice will follow.

DAVID STARR JORDAN. *The Heredity of Richard Roe. A Discussion of the Principles of Eugenics*. Boston: American Unitarian Association, 1911. Pp. 165. \$1.20.

To be reviewed.

IRVING KING. *Social Aspects of Education*. New York: The Macmillan Company, 1912. Pp. xvi, 425.

This book marks a new step in the development of educational literature. It is made up of extensive citations from what may be called source materials, supplemented by the author's introductory and critical discussions. The work falls into two parts: (1) The external social relations of education, and (2) the internal social

aspects of education. Under the former caption are included such topics as the social view of education, the social origin of educational agencies, the social responsibility of the school, school and home relationships, the school as a community center, playground extension, industrial and vocational education, and education as a factor in social progress. The internal social organization of the school involves a discussion of the social life of the school, school government, social aspects of mental development, and the corporate life of the school in relation to moral training.

WILLIAM A. MCKEEVER. *Instructing the Young in Regard to Sex*. Home Training Bulletin, No. 8. Manhattan, Kansas: Published by the Author, 1912. Pp. 16. Price, two cents to prepay postage.

This excellent bulletin gives the substance of the best recent literature on the subject. Bulletins previously issued are: No. 1, The Cigarette Smoking Boy; No. 2, Teaching the Boy to Save; No. 3, Training the Girl to Help in the Home; No. 4, Assisting the Boy in the Choice of a Vocation; No. 5, A Better Crop of Boys and Girls; No. 6, Training the Boy to Work; No. 7, Teaching the Girl to Save.

CHARLES MERCIER. *Crime and Insanity*. New York: Henry Holt & Co., undated. (No. 17 of The Home University Library of Modern Knowledge). Pp. 255.

Treats of the nature of crime, especially from a biological standpoint; devotes considerable space to the classification of crimes, shows the extent and the nature of the influence of insanity on crime, and suggests needed alterations in criminal law.

RALPH BARTON PERRY. *Present Philosophical Tendencies*. New York: Longmans, Green & Co., 1912. Pp. 383. \$2.60 net.

The sub-title, "A Critical Survey of Naturalism, Idealism, Pragmatism and Realism, together with a Synopsis of the Philosophy of William James," indicates the scope of this work. It is unquestionably one of the most interesting and important of recent philosophic surveys. Each of the leading contemporary trends in philosophy is presented sympathetically, yet with a keen critical insight, and the style of the whole is facile and entices to further reading.

CARL STUMPF, Editor. *Beiträge zur Akustik und Musikwissenschaft*. Heft 6. Leipzig: J. A. Barth, 1911. 5 M.

Contains valuable reports on experimental and critical work in the psychology of music, by Stumpf, Köhler and Schaefer. The article on "The Significance of Ethnological Investigations for the Psychology and the Aesthetics of the Tonal Art" has direct educational bearing.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

METHODS OF RESEARCH IN EDUCATION.¹

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The aspect of educational research, which the Executive Committee was so kind as to offer to me, is that of methods; specifically, that of methods which are promising for immediate application by instructors in departments of education not yet abundantly supplied with material facilities. The topic is a congenial one, and I have taken it up with interest, though I have, I think, no illusions as to the value of the suggestions I shall be able to make, except perhaps as incitements to discussion.

A fact that meets us on the threshold of a practical consideration of methods and which must determine our subsequent course is that in actual research it is the problem that dictates the method, and not the method the problem; or, more exactly, it is the problem, the state of knowledge of the field in which the problem lies, the interest of the investigator, and the facilities at his disposal. If our question, for example, is one of lighting, heating and ventilation, we find ready at hand the precise quantitative methods of physics and chemistry, and where they can be used there is usually no excuse for others. If it is a matter of grade of intelligence and advancement relative to age, we have the Binet-Simon test-scale. If it is the rôle of inheritance, we must gather statistics and calculate the correlations between parent and child. If it is the general character of children's impulses and interests, we are com-

¹Read at the Wellesley meeting of the New England Association of College Teachers of Education, December 2, 1911.

pelled to rely on the systematic observation of single children, on the questionnaire, and upon collation of biographies. In the case of problems of practical administration we must frequently make use of comparative studies of the experience of others. In still other cases—since pedagogy is a practical science and cannot always wait for the methodical solving of its problems—we are obliged to fall back on crude empiricism, the method which the comparative psychologists have called that of “trial and error,” the method of guessing at what ought to be done and trying it on.

If the problem dictates the method, it is with a handful of problems that I ought to begin what I have to say about methods; and as I am to deal with methods readily accessible to college teachers of education, I shall confine myself to college problems, for, while many of us lack special laboratories and experimental schools, we have each of us *ex officio* a college under our hands, and are in some measure responsible for the solution of its problems. I do this with the more confidence also, because I believe that these problems are for the most part typical, both in nature and in the methods of investigation by which they must be approached, of educational problems all along the line.

Here, then, is a group of problems, already somewhat worked upon, which can be treated by purely statistical methods on the basis of data to be found in the college registrar's office or readily to be obtained from other sources.

1. What are the causes of failure in college work?
Studied by means of the office records and information as to the college life and activities of the men who are dropped from college for poor standing. This question has been studied by President Schurman, Professor Miner and others.
2. The correlation between high standing in college and later success in the professional schools, and the correlation between success in certain special studies, as in history or in science, and later high standing in the law or medical school.

Both of these have been studied by President Lowell.

3. The correlation between high standing in mathematics or the classics and success in other directions. This has been studied by many different champions of these studies as means of mental discipline.
4. The extent to which a student's academic fate is sealed before his entrance to college, as shown by the correlation between scholastic records in the high school and the college. Studied by Professor Dearborn.
5. The inverse correlation between the habit of smoking and success in college work. Investigated some time ago by one of the Clark students.

Such problems as these are the easiest upon which to begin educational research, because the questions can be stated clearly and the material has already been gathered. The following are of the same sort, and, so far as I know, have not yet been studied to the point of publication:

6. Is there any relation between age of entrance to college and success in college work?
7. How far, if at all, can maturity and other similar advantages compensate for imperfect preparation for admission?
8. What, in general, is the effect on the work of a student in the graduate or professional schools of having taken the college course in three years? (President Lowell has gathered data on this point.)
9. A study, similar to that on college laggards, on men who do exceptionally well in college, and the causes of their success—their age, home conditions, participation in college activities, social standing among their mates, physical vitality, moral and religious character, etc.
10. Relative standing of men who concentrate on a few subjects and those who scatter over a good many.

Statistical Methods. In the use of all statistical methods there are, of course, certain essential precautions to be taken in gathering the original data and in its subsequent manipulation. And there is always necessary a certain circumspection in the interpretation of the final results. The most essential of these points of care are: First, to be sure that the data represent facts; then not to draw inferences from too few cases; not to mix figures which do not really stand for facts of the same kind; and never to forget that numerical results may frequently be explained with equal ease in several different ways. The first of these points is too obvious to need illustration. The second was sometimes illustrated by President Wright by a case in which, in a study of the ratio of criminality to population in a certain city, the Turks appeared to be the most criminal, having a record of 300 per cent., which, however, was in reality due to the fact that there was but one Turk in the city, and he had been arrested three times. An instance of the third, coming under my own notice, was that of lumping the statistics of conversion of young men and young women, which gave the age of most frequent conversion at a point above what it was in reality for the one group and below what it was for the other. In illustration of the last, I may say that it appears that students in small classes in college get higher marks on the average than those in large classes, but it will not do to conclude that this is due to the better pedagogical conditions in small classes, because smaller classes are generally in advanced subjects and the poorer students may have dropped by the way; or, since advanced subjects are usually elective, the small classes may be attended by those only who have a spontaneous interest in the subject. For the same reason the common inference, from the fact that high scholarship in all subjects is more frequent among those that have taken Latin, Greek and mathematics in the preparatory school and the lower college classes, that these subjects furnish a general training of a superior kind is not justified, for the weaker students may steer clear of them or fail if they take them, *i. e.*, these studies may act as a sieve instead of a gymnastic; or they may be taken chiefly by students from homes where the cultural standards are higher, *i. e.*, students from more successful

families, students endowed by inheritance with physical and mental powers above the average. For the detailed precautions to be observed in statistical matters, one would go, of course, to works on statistics; and naturally, in educational research, to Thorndike's "Mental and Social Measurements," or his "Educational Psychology."

I may mention, however, one other matter of importance in this connection, and that is the dependence to be placed upon the marks for college standing on which we rely for our evidence of success. There is, unfortunately, a widespread suspicion as to the value of college marks, not only on the part of students who succeed usually in getting a "gentleman's grade," but on the part of those who have to do with such marks for other purposes. This is to be regretted, for it is by no means unavoidable.

As now managed, college marks in different subjects probably do give some index of the relative success of students in those subjects as judged by their several instructors. A paper graded 95 by one instructor is probably distinguishably better than one graded 85 by the same instructor, but it is by no means certain that it is better than a paper graded 75 by another instructor whose subjective grade-scale is different. That such differences are common has been shown by Cattell, Meyer, Dearborn and others, and can easily be verified by anyone who cares to take the trouble to compare the marks assigned by his colleagues. This makes combination of the marks unsafe and their comparison often misleading.²

The variation comes largely from the fact that college instructors have usually, when they begin, no special training in assigning marks, and no effort is made to urge or assist them toward uniformity of standards. Improvement naturally results through social pressure when each instructor knows how his own marking habits compare with those of his colleagues and what in the long run the proportionate frequency of the marks of various grades ought theoretically to be, which can be shown

²Difference of grades from instructor to instructor in any single year is, however, not by any means a sure sign of difference in subjective standards, even when the instructors deal with parallel sections in the same subject. It may be due to an unfortunate chance in the grouping of students, as was brought out by Dr. Norton of Harvard in the discussion following this paper.

ly the publication of the proportion of marks of each grade assigned by each instructor at the last previous examination period, or his average for the past year or two, together with the theoretical proportions, and, if necessary, with a simple explanation of what the figures mean. It is even possible, as Dean Ferry of Williams has done, to calculate, from a sufficiently large collection of marks by different instructors, a numerical coefficient by which the marks of the aberrant can be reduced to the proper general standard.

Besides this general lack of uniformity in the meaning of the grades assigned, there is also another habit of instructors which is useful perhaps pedagogically, but injurious to the marks as data for pedagogical research. I mean the habit of using the marks as rewards and punishments, giving the student who deserves encouragement a higher grade than the bare quality of his work would justify, and shading downward the mark of a student who has not worked so faithfully as his instructor believes that he ought. Of the same sort is the custom of certain instructors to cut down the scholarship mark as a penalty for absence. These customs introduce into the records factors which tend to irregularity, and which it is impossible to remove. It would be much better if the students could be graded separately for each particular aspect of their work—scholarship, diligence, attendance and other matters if necessary—and the marks combined after filing in the registrar's office according to an established system. We should then have data on scholarship which would be purer than under the present system.³

After making sure of the reliability and adequacy of the original data, the next precaution is, as I have said, to avoid misleading mixtures of the data having reference to different classes of cases. In studying the correlation of the age at entrance to college with success in college work, it would, of course, be necessary to discriminate those who came late to col-

³It would perhaps be possible to test the efficiency of college marks as general indexes of ability by testing their correlation with the grading of the students in (1) the skilful use of English, (2) their skill in discovering and exposing the error in fallacious arguments, (3) with their grades when graded by their fellow-students after the manner used by Cattell in his study of American Men of Science.

lege through ill-health or through the necessity of earning money to pay their way from those who came late from sheer stupidity; and in interpreting the result it would be necessary to consider the various distractions and other causes of poor success in college work and to determine whether these were operative equally at all ages, before one could arrive at a statement with reference to age alone. Similarly, if it should appear that three-year men were less (or more) successful than four-year men in their later professional studies, it would be necessary, before concluding that the three-year course was in general a bad (or a good) thing, to consider the type of men who now take it. The value of statistical results lies in their just and skilful interpretation, and their interpretation is often an especially serious matter in the complicated cases with which educational researches have to deal.

The Questionnaire. In the case of many other problems of interest to educators the data are not already in existence, but must be secured by some sort of a census-taking or questioning. If, for example, one should undertake a study of the heredity or of the present home conditions of the bright or dull men in college, or, for light on vocational training in college, should try to find what proportion of students enter with a definite vocational bent, how many change their life-plan during college, and how many follow, after graduation, the plan which they formed in college, it would evidently be necessary to depend chiefly on data furnished by the students themselves in interviews or in response to a schedule of questions.

The method of the questionnaire is one that can be applied with all degrees of rigidity and laxness, and can furnish accordingly data of all degrees of value from those which are susceptible of rigid mathematical treatment and yield results of practical certainty to those which cannot fairly be made to yield any quantitative statement at all, and are perhaps overpraised if regarded as worthily suggestive. The ideal questionnaire is one which asks for information which the questionee is sure to possess and willing to give, and which he can state briefly and unequivocally—which asks questions, for example, that can be answered by “yes” or “no,” or by definite statements of facts or figures.

When it goes beyond questions of this sort and asks for matters of personal history or of opinion and belief, it soon reaches a point where a quantitative treatment of the data is impossible, or, if possible, is often misleading. The best that can then be done is to gather the material into characteristic groups or types and to attempt little beyond a liberally illustrated description of these.

A second important point is to see that the questions are answered by all of the group which you have under consideration, or, if it is too large for that, by a perfectly fair and adequate sample of the whole group. A set of questions with reference to conversion answered by a class of clergymen would, of course, be hardly a fair basis for inference as to the religious experiences of the man in the street.

A good many years ago the English Society for Psychological Research gathered many replies to a questionnaire, of which the chief question was as follows: "Have you ever, when believing yourself to be completely awake, had a vivid impression of seeing or being touched by a living being or inanimate object, or of hearing a voice; which impression, so far as you could discover, was not due to any external physical cause?" In case of an affirmative answer, a description of the experience was asked, with particulars as to the time and circumstance. The question was carefully worded, and seems tolerably plain; the answers ran into the thousands, and the returns were conscientiously and even critically worked over, and yet they left the real facts of the matter in many respects uncertain.⁴ The figures seemed to show that women are more subject to such experiences than men, but it is not sure that the experiences are not as frequent with men, for they very likely forget them more frequently in their busier and more varied lives, and so report them less often. Even the frequency of the experience among both men and women is in doubt. As the number of returns rose, the proportion of affirmative answers fell off, showing probably that the collectors had quite unconsciously not taken people at random, but asked those first whom they judged would be interested to answer the questions, and

⁴See criticism by Parish, "Hallucinations and Illusions," New York, 1902, pp. 83 ff.

this often meant people who had had such experiences. Later, when these interested people were exhausted, the proportion of those asked who had not had such experiences increased. Even the great preponderance of visual hallucinations over those of the other senses, which the figures seem to show, has been called in question on the ground that those of vision are better remembered than those of the other senses, and evidence to support the contention has been drawn from other portions of the data themselves.

If complex matters, where misunderstandings are easy and where forgetfulness or inattention is liable to make the replies unreliable, are to be studied, it is well that the questioner make his inquiry in person and explain and cross-question as occasion demands. A few cases thus thoroughly worked out at first hand are, of course, of more value than a much greater number collected carelessly and embodying only such things as the questionee chanced at the moment to think of and set down.

Two small questions which might possibly repay investigation in this way I may mention in passing:

1. The moral code of students with reference to questions involving the college or behavior toward other students and its sanctions. This has been touched upon experimentally by Sharp in a paper some years ago in the *American Journal of Psychology*.

2. Students' methods and habits of study—not so much as to time spent as to the manner in which the work is done.

Experimental Methods. Much more difficult in execution, but also more certain and definite in results, are the methods of direct experimentation. Of these there are, roughly, three types:

1. The painstaking introspective study of various forms of the learning process under laboratory conditions. This is hardly to be distinguished from experimental psychology, and most of it has so far been done in the psychological laboratories. I refer to such work as that of Meumann and other German investigators on economic methods of memorizing, and to such work as that of Bryan and Harter, Swift, Book

and others in this country on the acquirement of skill in telegraphy, ball-tossing, shorthand, typewriting, and the like. Such experiments as these require the resources and technique of the laboratory, and are not likely to be undertaken by teachers of education unless they are both fortunately situated and have strong psychological leanings.

2. Then there are the studies of individual differences and the testing of capacities of various kinds, which promise in the end to give us a science of psychography—in other words, a schedule and a procedure by which we can take the psychic measure of a man in all important particulars and inventory all his characteristic qualities. This work, in anything like completeness, is yet in its beginning, and is connected in its recent developments especially with the name of Stern, in Germany. In a simpler way it has given us the Binet-Simon test-scale for determining the psychological age of backward children. To this type also would belong the tests and measurements worked out so fully in Whipple's "Manual of Mental and Physical Tests." And closely connected with this type of experimentation, though important enough to deserve the name of a method by itself, is Thorndike's work in the establishment of standard scales of excellence for the quantitative measurement of excellence in penmanship and elementary English, and that of Courtis and others for work in elementary arithmetic. Many of the experiments of this type also call for equipment and technique, though the practical value of the studies of the individual pupil and the simplicity of the test material or its use of schoolroom products bring it nearer to the daily business of the student of education.

3. The experiments of the third type are strictly pedagogical—experiments made under school conditions, with the ordinary materials of the classroom, in order to answer strictly pedagogical questions. Such, for example, is the work of Lay in Germany on the first steps in number, of Winch in England on the possible transfer of the educative effect of work on the fundamental operations of arithmetic to improvement of mathematical reasoning, of Gilbert in our own country on the teaching of zoology in such a way as to keep in view its practical bearings as compared with the teaching of the same sub-

ject as pure science, and of Pearson on the teaching of spelling --the last three reported in the JOURNAL OF EDUCATIONAL PSYCHOLOGY.

In this sort of experimentation pedagogy comes to her own. The essence of the method is to submit to educative processes which are different in one clearly defined particular two groups of pupils which are, as regards native ability, previous schooling and all other essential items, as much alike as they can be made, and to compare results, stated in some definitely quantitative way. If, for example, a teacher of the mother tongue wished to determine whether facility in composition is to be more readily acquired by much practice in writing or by memorizing extracts from the best models (as a French experimenter has seemed to find it), he would proceed as follows: He would first divide his class into two sections, having regard to marks previously obtained in composition, in such a way that the average ability was as nearly as possible the same in both sections. He would then for a semester, say, demand a daily theme of one section and of the other an equal time spent in committing to memory and reciting aloud an assignment of good prose, while care was taken to secure as great uniformity as possible in all other work done by the two sections. At the end of the semester test themes would be required of both sections—or perhaps several themes—and the productions would be marked and compared, and the value of the methods judged according to the results. It would be desirable, probably, that marks be assigned for more than one quality; for example, for correctness as well as for facility of diction, and that the papers be graded by someone ignorant of the purposes of the experiment and of the membership of the sections. For greater certainty the treatment of the sections should be reversed during the second semester and the results again compared.

In all such experiments the attitude of the instructor is, of course, a very important factor, but, if he is worthy to be an investigator at all, he will know enough not to spoil his own experiment by carelessness in the management of it or by bias in estimating its results.

The comparison of the products in such an experiment would

be possible on the basis of gradings according to the usual school methods, but it would be improved in certainty and precision if it could be carried out by several readers, and especially if it were checked by the use of a standard scale of attainment in English composition against which each individual's production could be measured off and assigned a definite value.

The construction of such scales is worth a little consideration, for they promise to bring within range of quantitative measurement many phenomena the proposal to measure which has until recently seemed visionary, if not absolutely chimerical. To Dr. Thorndike belongs the credit of having pushed forward as a pioneer in their construction. See his papers in the *Teachers College Record*, XI, No. 2, March, 1910, and the *JOURNAL OF EDUCATIONAL PSYCHOLOGY*, II, No. 7, September, 1911, 361-368.

The production of a reliable scale is no easy matter, and requires the co-operation of a number of conscientious judges, but it is worth the labor. In substance the method is this: Given a large number of samples of the product in question, say 1000 specimens of handwriting, of all grades of quality from the very poorest to the very best. The whole set is classified individually by a number of competent judges (perhaps 30 or 40) into 10 groups as nearly equally different in quality as each judge can make them. The record of the classes in which each specimen is placed by each judge is kept, and by calculation gives an average rating for each specimen depending on the judgments of all the judges—a rating which it is fair to assume is very much more reliable, that is, is very much more nearly right than the rating of any single judge.

From the whole 1000 specimens thus rated it will be easy to find one or more examples which correspond almost exactly with the ideal grades 1, 2, 3, 4, etc., which measure off by equal distances the range of difference from the worst to the best specimens. These taken by themselves can be preserved as permanent samples, and together form the standard scale, which can be photographed or otherwise reproduced, and can be had by anyone who needs to grade handwriting. Any new piece of handwriting to be graded can be compared with these

and be assigned its grade as it falls above or below or exactly coincides with one of the samples. Such a scale does not, of course, enable us to perceive differences which we cannot perceive without it. It is not a microscope, but a footrule. It should enable us, however, to give our impressions of difference an objective and quantitative statement which can be apprehended by any other worker who has a standard series like ours.

The invention of such scales is, in my opinion, full of promise for the scientific study of educational problems. I believe with Thorndike that "if a number of facts are known to vary in the amount of anything which can be thought of, they can be measured in respect to it," and I am hopeful that the time may yet come when it will be possible to meet critics with figures and to demonstrate in a quantitative fashion that one sort of college training is better than another.

SHALL WE TEACH SPELLING BY RULE?

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Though a comparatively large number of common words and their modifications are subject to carefully-phrased rules of spelling, one may seek in vain among educators and texts for a convincing answer to this question. One college professor assures us that it is evident that rules are worthless.¹ Another says, "There are a few simple rules for spelling which should have prevented at least half of the mistakes" (made in certain examination papers or essays).² The *Natural Speller and Word Book*, copyright by A. S. Barnes & Co., 1890, does not contain a single rule, and there are other modern spellers that take a similar attitude. In others the dose varies greatly in amount and frequency. The *Normal Course in Spelling*, published by Silver, Burdett & Co., stands close to the other extreme, with 18 rules in the course of 18 consecutive lessons, 7 of them on plural formation. And even then it is forced to omit the time-honored "*i* before *e* except after *c*," etc. The length and simplicity of rules in different texts varies from "Nouns in *o* after a vowel add *s* for the plural," with no exceptions, to "In monosyllables and words accented on the last syllable, a final consonant after a single vowel doubles before a suffix beginning with a vowel (*x*, *k* and *v* are never doubled), except when, in the derivative, the accent is thrown from the last syllable of the primitive," followed by the almost ubiquitous "other exceptions."

It was to test, if possible, the worth of these guides that the following list of 50 words was framed. It was intended to be a fair test of spelling ability, since it contains only those words

¹Educational Review, 42: 176-79.

²Independent, 67: 346.

which intelligent people have frequent occasion to use in written discourse.

1. ancient	13. encouragement	26. loveliest	39. gases
2. seizure	14. awful	27. buried	40. stoppage
3. foreign	15. argument	28. plenteous	41. quitting
4. freight	16. peaceable	29. conveyance	42. benefited
5. their	17. changeable	30. essayist	43. quarreling
6. conceivable	18. courageous	31. betrayal	44. potatoes
7. piercing	19. shoeing	32. dismayed	45. folios
8. thievish	20. singeing	33. paid	46. music
9. grievance	21. mileage	34. daily	47. frolic
10. sieve	22. pitiable	35. concurrence	48. derrick
11. achievement	23. furious	36. regretted	49. tying
12. nervous	24. greedier	37. conference	50. dying
	25. fanciful	38. rebellion	

It will be seen that this list is composed of words which exemplify seven rules in spelling and their exceptions.

Words 1-11, inclusive, are calculated to test a rule which is often expressed as “*i* before *e* except after *c*, or when sounded like *a*, as in *neighbor* and *weigh*.” Words 7-11, inclusive, illustrate the first clause of the rule, word 6 the second and words 4 and 5 the third; words 2 and 3 are exceptions to the first clause, *ancient* is an exception to the second clause.³

Words 2, 6-9, inclusive, and 11-21, inclusive, are designed to cover a rule which may be given thus: “Final *e* is dropped before a suffix beginning with a vowel; but it is retained (1) when the suffix begins with a consonant, (2) when a word in *-ce* or *-ge* suffixes *-able* or *-ous*, (3) to keep the pronunciation of a word constant, (4) to maintain the identity of a word.” Words 2, 6-9, inclusive, and 12 illustrate the dropping of *e*; *mileage* is an exception; words 11 and 13 show retention under case (1); 14 and 15 are exceptions to case (1); words 16-18, inclusive, come under case (2); words 19 and 20 stand for cases (3) and (4).

Words 22-34, inclusive, call into use the rule on final *y*. “Final *y* after a consonant changes to *i* before all suffixes not beginning with *i*; final *y* after a vowel is usually retained.” Words 23-27, inclusive, illustrate the first part of the rule, *plenteous* being an exception; words 29-32, inclusive, illustrate the last part of the rule, while *paid* and *daily* are exceptions.

³It is contended that exceptions to the various rules are not over-represented in this list. Reed's *Word Lessons* or any exhaustive speller with carefully organized lists of words will substantiate this.

Again we may say, "Monosyllables and words accented on the last, ending in a consonant after a single vowel, double that consonant before a suffix beginning with a vowel, unless the suffix changes the accent." Words 35-42, inclusive, are considered here. *Gases* is an exception, *conference* shows the change of accent upon changing the suffix, and *benefited* is a word not accented on the last.

Words 44 and 45 were intended to bring out the less familiar rule that "Nouns in *o* after a vowel add *s* for the plural"; *music* and *frolic*, with *derrick* as an exception, show that polysyllables ending in the sound of *k*, in which *c* follows *i* or *ia*, do not add *k*; the last two words (49 and 50) illustrate the rule that words in *ie* substitute for them *y* before *ing*.

Special effort was made to include words with only one authorized spelling. Unfortunately, after the first test it appeared that some authorities allow *quarreling* two *l*'s. Accordingly, it was left out of account in the consideration of the rule for the final consonant. *Payed* was marked incorrect, inasmuch as that word was probably not the one meant by any person tested.

By courtesy of Dr. H. A. Watt the test was tried in three sections of Freshman English in the University of Wisconsin. These students were a semester behind their class in English because of deficient preparation. The chief reason for using them in the test was the fact that over 50 per cent. of the 70 papers submitted⁴ were from students who, in February previous to the giving of this test in November, had completed the special course known as Subfreshman English, a course in which among other things special emphasis is laid on spelling, the rules in general being thoroughly taught according to Wooley's *Mechanics of Writing*. It should be said, however, that no instruction in spelling rules had been given during the present semester, though individuals had been referred to rules as their work required. The instructors gave this test as a part of the regular work, graded the words and noted the results.

⁴Seventy-six papers were received in all, but those of four foreigners, one person who came late to the class, and another person evidently of very defective hearing, were thrown out. In the other papers there was scarcely any difficulty from lack of understanding.

The written instructions given each instructor were as follows:

- I. Spell the following words, numbering from 1 through to 50. (Then followed the list given above.)
- II. Without changing any spellings, write all rules you consciously used in spelling this list, and after each rule the number of the words on which you used it, as 1st, 17th, etc. Do not be troubled by apparent exceptions to any rules you have in mind. Practically all have their exceptions.
- III. Write all rules you see exemplified by this list, but which you did not think of while writing. If you can't give the rule for any case exactly, give its essence, or tell what it is about, even in a vague way. We want all you know about spelling rules.
- IV. If you should be unable to give any data under II or III, answer whether anyone has ever tried to teach you any rules for spelling.

A desire to please the instructor may have induced some to place rules not consciously used in the class consciously used. Some were intentionally or unintentionally guilty of mixing the two classes, but they were exceedingly few. There is very slight evidence that the students were writing for the benefit of the instructors. One who fell somewhat below the average apologetically says: "The writer will admit that his spelling is not up to standard, but when he has any literary work to do his trusty Webster is always beside him." On the whole, the students were commendably frank.

About two weeks later, almost the same test was given to 39 seniors and 30 freshmen in Wisconsin Academy, a secondary school under the control of the University. The word *daily* was replaced by *solos* coming under a different rule, and *quarreling* by *exhibition* coming under the same rule. The first four rules brought out in the test had been taught to these pupils about two months before, though in a simpler form than that given above, by a teacher of experience and

ability. A list of 10 to 20 words exemplifying these rules had been worked through daily in the classes, some 10 successive days in the freshman section and possibly 3 days in the senior section. The test was given about six weeks after the rules had been dropped as a class exercise. The fourth instruction to the university freshmen was therefore struck out and the academy seniors asked to give frankly their opinion of the value of spelling rules to them, without regard for the supposed ideas of the teacher. No such question was put to the academy freshmen. The regular teacher gave this test also, as it was felt that the results would be in every way more trustworthy.

As each of the seven groups of words were corrected separately, it followed that the papers fell into three classes: (1) those whose writers had consciously used a rule in writing that particular group of words; (2) those who later recognized a rule governing that class of words, but did not consciously employ it, and (3) those who could not recall, even with the members of the group placed practically in juxtaposition in the list, that a rule applied. The records of these three classes is compared for each rule separately, for each rule is a problem in itself. One rule may be very helpful; another not at all.

A possible objection to this method of comparison may be foreseen. It may be said that the showing of rules is prejudiced by charging up against them the errors of those who cited the rule partially or incorrectly. But in answer it may be said that, if the rules naturally lead to confusion and error when handled by good teachers, the case against them is all the more clear.

Again, it may be said that the poorer students damaged the showing of rules by citing their imaginings as rules. This is disproved by the fact that the 56 college students who recalled any form of any rule averaged 85 per cent, on the whole test, while the other 14 averaged only 81 per cent. Practically the same was true of the academy students. It therefore does not appear that the poorer spellers conjured up rules to harm the evidence in favor of rules.

But someone may say that the figures just cited answer the whole inquiry, so far as the efficiency of rules is concerned, in the affirmative. Each rule, however, we repeat, must be judged on its own merits, and not the whole body of rules *in toto*. Moreover, each rule must be judged as to its efficiency not by whether the word as a whole is spelled correctly, but by whether the part of the word covered by the rule is correct. For instance, all words involving the diphthong *ie* or *ei* will be marked correct so far as the observance of the rule is concerned if the members of the diphthong are in proper order, even though there may be a mistake elsewhere in the word.

In estimating the efficacy of rules with the academy students it was found impossible to allow for misunderstanding of the words. Some persons occasionally spelled another than the

one given, and did it correctly, but a great many words were simply "spelled at" or omitted. Certain arbitrary rulings became indispensable to avoid endless and unsatisfactory computation. For example, if an *ie-ei* word was omitted altogether, the members of the diphthong of course did not appear in proper order, and an error against the rule was charged. But if final *e* was omitted, if the rule was followed by writing the word without *e* or even by omitting the word, no error was charged. It was felt that such a course was not unfair with reference to the object of the investigation. Pupils knowing rules of spelling and those not knowing the rules would, so far as there is reason to judge, be equal in breadth of vocabulary and in acuity of hearing. And these two factors are the only ones which could enter into the misunderstanding or omission of words.

Results for seniors and freshmen of the academy will be combined so as to secure a fairly large group, one almost exactly the size of the one tested at the university. There is little difference between the academy classes in respect to the efficiency of rules. They were taught by the same teacher, and there does not seem any good reason for separating the results. The freshmen remembered much more of the rules than the seniors, which is not at all strange when we consider that the freshmen are just from the elementary school, with its large amount of drill work and exact memorizing. The freshmen attained a much lower average than the seniors with regard both to general spelling ability and the observance of the rules. Their immaturity seemed more than to offset their greater knowledge of the rules—knowledge in the sense of amount memorized.

In the writer's opinion it is impossible to separate absolutely the conscious functioning of a rule from its automatic functioning. A rule might function consciously and very usefully for a time and then cease to function consciously. Still, it would have served an advantage in fixing certain forms. It is for this reason that the records of all those having any knowledge of the rule are presented together. Some advocates of rules may go so far as to assert that those unable to cite any sort of a rule might realize a benefit from the rule be-

fore it was forgotten. Of this the writer is very doubtful even for a stretch of years, and it certainly would not hold in the case of those subjected to this test. The recency with which they had been taught the rules certainly gave the latter every possible advantage. The figures in the accompanying table

OBSERVANCE OF THE RULES.

TABLE OF RESULTS.

Rule.	Conscious of rule while writing.				Unconscious of rule while writing.				Combination of all citing a rule.				Unable to cite any rule.			
	Acad-emy.		Univer-sity.		Acad-emy.		Univer-sity.		Acad-emy.		Univer-sity.		Acad-emy.		Univer-sity.	
	Cases.	Av. %	Cases.	Av. %	Cases.	Av. %	Cases.	Av. %	Cases.	Av. %	Cases.	Av. %	Cases.	Av. %	Cases.	Av. %
<i>ie-ei</i>	16	79	25	87	15	71	5	87	31	75	30	87	38	73	40	86
final <i>e</i>	31	82	20	87	21	78	9	94	52	80	29	89	17	82	41	88
final <i>y</i>	11	74	18	94	18	67	13	95	29	70	31	94	40	73	39	91
final consonant.	15	78	32	88	27	72	2	87	42	74	34	88	27	75	36	84
final <i>ie</i>									5	80	18	95	64	61	52	69

are based only upon adherence to the rule; this distinguishes them from all previous ones, which have been based upon correctness or incorrectness of the entire word. We shall be able to devote only a paragraph to the discussion of each group of words.

Curiously enough, most of the collegians who cited a version of the *ie-ei* rule as consciously used relied upon the word "Alice" and other mnemonic devices which gave a clue to only one or two of the 11 words. The slight superiority of those citing a rule does not, therefore, seem to be entirely due to the rule itself. Three made one or more errors by stating the wrong rule and following it; four made one or more by not following the rules they cited. No academy freshman cited the rule as recently taught, but four had it almost correct. Several of them said something about "When the word ends in *ie* or *ei*," etc., plainly mixing it with two of the other rules. Three seniors gave the rule substantially as taught, but nearly all the others who cited anything gave a version of something taught in earlier years, the "Alice" rule, etc. The rule seems more likely to stick as first learned. The favorable results in the academy tend to confirm the questionable advantage of the rule in the university. The greatest handicap to its effectiveness is probably the numerous exceptions.

Sixteen distinct rules came from the 20 collegians citing a rule for final *e* in conscious use. The most nearly complete was "Drop final *e* before a suffix beginning with a consonant or to preserve the identity of a word." The rule seemed to be too complex for most of the writers. They gave it in general outline, without any qualification, or gave some very special application only. Several who had the special case of *-ce* and *-ge* in mind fared far above the average. Three-fourths of the academy students remembered, or imagined they remembered, some part of this rule. About a dozen had it very nearly exact in the simple form in which it had been taught them, but their grade was not above the mean. By virtue of the higher average of those unconsciously using the rule, it obtained a slender advantage in the university, which it more than lost in the academy.

Several college students cited the rule for final *y* in acceptable form. The academy freshmen exceeded the seniors in its recall, both quantitatively and qualitatively. The seniors seemed little inclined either to use or to remember it. Two facts appear here in comparison. In the first place, while the observance of this rule was easiest of all for the college group, it was most difficult for the academy group. In the second place, the value of this rule showed an advantage of 3 per cent. in the university group, but it lost an equal amount with the academy students. The two phenomena coming together seem to show that more than simply the use of the rule is involved. The only explanation which occurs is that the group of words here in question might have been the subject of much greater emphasis with one teacher than with the other. That being true, the rule in all probability received more emphasis in the one group than in the other.

Several of the college students were able to approximate the rule for doubling the final consonant. In this case the citations were defective rather than incorrect. There seemed little in the rule to cause them to confuse or misapply it. About 15 of the academy freshmen and only 3 of the seniors quoted the rule almost as taught them, but they failed to show any better average than those who made defective or erroneous citations. The rule taught them, correctly applied, would have

given an average of over 83 per cent. instead of only 74 per cent. This throws somewhat under a cloud the superiority of the rule in the college group, but does not destroy it.

The little rule for the last two words of the list tells a different story. It applies to a class of words without exception. Thirteen of the 16 collegians who used it consciously, cited and applied it correctly. The academy students who had sometime learned it showed practically an equal advantage, but they were less successful in applying it, though four of them quoted it correctly. The rule on *music*, *frolic* and *derrick* was given by no one, so there was no chance for comparison. A few who tried to formulate a rule for the two or three plurals ran about 20 per cent. below their fellows.

The attitude of the college freshmen seemed generally unfavorable to rules. Teachers were charged with having laid but little stress on the rules, or with having failed to insist on their application till thoroughly understood. One writer said that he "knew most of the spelling rules, but they have become so indefinite in my memory that I am mixed up if I use them." Another says that he "attempted to learn rules for spelling, but thought it added to the difficulty." Four others declare, after giving one or more rules, that they have decided that the way the word "looks" is the best guide. One of them complains of the long list of exceptions. Four who had been in the Subfreshman English reported that they had lost almost all of the rules then taught them. One gives this rather amusing testimony: "I was greatly helped, but because of lack of practice they have grown vague." There is a very suggestive point here, which is, that it may be just as difficult after children have been spelling visually or automatically for several years to work them over to a logical basis as it is in language to work from an habitual-expression basis over to a grammatical basis. The academy seniors gave corroborative testimony on all points. Ten only of nearly 40 ascribed any value to rules.

To summarize, no one rule was professed to be known by half the university students, though over half of them had all these rules, and other besides, only the winter before, to say nothing of those who had been over the ground in the public

school. A trifle less than half of the academy students on the average had the courage to try to give the rules they had worked out only six weeks before. Let us deduct from this miserable showing of those who are conscious of the existence of a rule those who cited the rule so incompletely or erroneously as to make it positively bad. Let us then compare the residue of what little advantage (?) the knowledge of rules may confer on a few with the vast amount of time spent in teaching these rules at different times to all. Does it pay? The writer does not believe that a single rule which he tested demonstrated its efficiency, except the little one for the last two words of the list. It is at least evident that rules for spelling do not teach themselves; that if teachers do not insist upon their being learned they will be neglected; that they cannot be taught once and then dismissed from attention like an event in history; that thoroughness of digestion demands that they be given in widely-separated doses, and that they must be introduced, if at all, in the elementary school during the habit-forming period, while the pupil still spells reflectively rather than automatically. The presumption is even then against a favorable outcome, except with a superior teacher.

RETARDATION IN FIFTY-FIVE WESTERN TOWNS.

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Recently the writer had occasion to investigate the grade-age status of 17,279 children in the grades below the high school in 55 villages and smaller cities in Minnesota, and possibly the results may prove of interest and value to others.

A word about the towns themselves. They have, on the whole, excellent school systems, each having a high school, which, together, with the grades that sustain it, is inspected annually by the "State High School Inspector" to ascertain if the work done is such as to entitle it to "special State aid," which is granted annually to such schools as he approves because of their high standard of efficiency. The towns are widely scattered throughout the State, so as to represent every variety of social and industrial condition. Some are old (as Western towns go), others new; some are largely peopled by recent immigrants, others are almost exclusively American; some are principally engaged in manufacturing, some in lumbering, some in mining, while others are mainly agricultural. Yet, in spite of this wide range in the conditions surrounding the towns studied, the prevailing tendency among them, individually considered, is about the same, and the study yields a fine average for the State, which would not, I am convinced, be greatly modified if all the towns were included.

Only the pupils in the grades below the high school are considered, for the reason that the high school students are invariably promoted by *subjects*, and are required, in case of failure, to repeat only the study in which they failed; hence statistics as to retardation among them, in the sense that the

term is used concerning grade children, are not easily obtainable. Promotion by subjects obscures class and grade lines, and makes figures based upon retardation by *subjects* difficult to compare with figures based upon a grade or *year* of work. Then, again, most of the retarded pupils have become discouraged before the high school is reached, and, having nothing to fear from the truancy law, owing to their age, have dropped out of school altogether. So the problem of retardation becomes confused by the kindred problem of elimination in such a way as to make the study of either alone very difficult.

Dr. Ayres, in "Laggard's in Our Schools," sets up a certain standard for measuring the amount of retardation, which has been widely followed by others. By it children in the first grade are considered normal if they are not over eight years of age; in the second grade the norm is nine years, and so on. The reason for allowing that extra year in the first grade and in each successive grade is not given, beyond the bare statement in the text that the ages allotted to each grade are those used "by common consent." In the towns studied, at least, the practice is quite different. In each of them the children enter at six years of age or less, the number entering later than six being approximately offset by the number entering before they are six. The effect of the Ayres standard if applied to these schools would be to conceal one year's retardation for every child, possibly, during his progress through the grades.

In the actual administration of these schools the children do enter at six, spend a single year normally in a grade, and, unless retarded, having entered the first grade at six, they find themselves in the second grade at seven, and so on. Now, to illustrate how the Ayres standard conceals retardation, we have only to suppose that a child enters the first grade at six, and the second, the next year, at seven, and the third, the next year, at eight, but, failing to "make good" in that grade, he remains there two years, repeating and certainly retarded, yet

his age when he finally reaches the fourth grade at ten is normal under the Ayres standard, and under that system he would not show as retarded when he really is.

It is no doubt more correct than either the Ayres or the Minnesota method to follow the *progress* of each individual child, but the data for such a standard are not at hand in this State.

We might add that from the administrative point of view the State expects to provide each child with eight years of grade schooling, and no more. He is to begin this at the age of six, and from this point of view, if he waits till he is seven before entering, he is already behind the schedule. He will get through school one year later than he otherwise would, for the records show that a year once lost is rarely recovered; indeed, the same causes that operated to produce the lost year continue, with exceptions, to keep the child retarded. This is shown by the fact that during the year 1909-1910 in 96 school systems in Minnesota, with 40,710 children in the grades, only 400 promotions ahead of the schedule were made. At the same moment 4640 of the children were "repeaters." That is a ratio of 10 to 1. There is nothing to show whether the 1 per cent. thus promoted consisted of repeaters regaining their lost grade or of bright children who were skipping a grade. Probably there were some of both. At the same time, 59.3 per cent. of all the children enrolled were behind grade, so it must be evident that the number regaining a lost grade is relatively few. The child who enters late or loses a year will get out of school, therefore, that much later, and loses that much of his economically productive life, which is what the State has in mind in educating him at all.

The complete results of these investigations are given in Table A, which shows the grade-age status of 17,279 grade children in 55 towns in Minnesota. The data were gathered in the fall, and account only for children then actually enrolled. This makes the showing favorable to the schools, because some of the children who failed of promotion in the spring doubtless dropped out of school during the summer. Had the data been collected from the school records at the end of the year, the percentage of retardation would have been greater.

TABLE A.

Shows, grade by grade, and by sex, the per cent. of retardation.

Gr.	Numbers			Percentages					
	Total.	Boys.	Girls.	Retarded.		Normal.		Advanced.	
				Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
1	2691	1436	1255	34.7	33.6	57.8	59.0	7.5	7.4
2	2065	1096	969	54.0	41.1	37.8	47.2	8.2	11.7
3	2164	1134	1030	61.1	53.7	33.1	38.0	5.8	7.4
4	2268	1134	1134	65.9	56.1	28.2	35.5	5.9	8.4
5	2129	1109	1020	68.8	63.2	25.2	29.8	6.0	7.0
6	1944	977	967	73.7	67.7	21.0	25.0	5.3	8.0
7	1862	929	933	70.4	65.9	24.3	27.1	5.3	7.0
8	2007	886	1121	74.0	67.0	30.5	26.4	5.8	6.6
Total: 17,279.		Averages:		58.7		34.1		7.1	

In studying this table one will note two things in particular, both probably contrary to popular opinion. First, the boys equal or exceed the girls in number in every grade up to the seventh, where they fall only four behind. It is in or at the close of the seventh grade, then, that the boy meets his decisive defeat. From then on the girls outnumber him, both in the eighth grade and, in fact, in all four years of the high school. Second, the retardation begins heavily in the *first* grade, and steadily increases, grade by grade, through the eighth grade, with the exception of the slight downward drop of the curve beginning in the seventh, which is practically overcome in the eighth. This drop is very likely due to the working of the law of elimination, and not to any change in the matter of retardation itself. A third matter, quite as one would have predicted, is that the retardation of the boys is greater than that of the girls from the very start, and remains so, grade by grade, to the end, varying from an excess of 1.1 per cent. in the first grade to 7 per cent. in the eighth grade.

The average percentage of retardation officially reported to exist in these schools, under their own standard of requirements, is 59.3. As I have said elsewhere before, when the course of study and the other demands made are such that only 40.7 per cent. of the children can and *do* meet them, we have an alarming state of affairs. To be rated as abnormal, under these conditions, is the usual or normal state.

There is an important factor, never alluded to, so far as I have discovered, in the literature of the subject, and that is

the practice, almost uniform among superintendents, of promoting a child at the end of two years in a given grade whether his work actually merits it or not. This practice conceals a considerable amount of the very worst sort of repeating, and likewise, by forcing a child on through the grades artificially, reduces the seeming amount of retardation. Similar to this practice, in its effects, is another—that of promoting a child “on trial” when he does not quite meet the requirements, but for one reason or another he is permitted to continue with the class. Once so permitted to advance, they are kept in this unearned position by the very same forces that caused them to be placed there. They are rarely reduced to their proper grade. This tends to reduce the apparent amount of retardation also.

While, as we have shown, the Ayres method of computing retardation would not hold true for these towns, nevertheless, for the sake of comparison, we have reduced the data used to that scale, and give the results in Table B.

TABLE B.

This is Table A reduced to the Ayres standard for retardation.

Gr.	Numbers			Percentages					
	Total.	Boys.	Girls.	Retarded.		Normal.		Advance.	
				Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
1	2691	1436	1255	14.6	9.1	77.9	83.5	7.5	7.4
2	2065	1096	969	22.5	17.3	69.3	71.0	8.2	11.7
3	2164	1134	1030	30.6	20.8	63.6	71.8	5.8	7.4
4	2268	1134	1134	38.2	27.7	55.9	63.9	5.9	8.4
5	2129	1109	1020	44.2	34.8	49.8	58.2	6.0	7.0
6	1944	977	967	47.4	38.5	47.3	53.5	5.3	8.0
7	1862	929	933	44.2	36.3	50.5	56.4	5.3	7.0
8	2007	886	1121	45.3	39.5	49.2	53.9	5.5	6.6

This gives the average percentage of retardation as 30.9. And that is serious enough. However, this is only 52.1 per cent. of what is really *known* to exist in these schools. The balance is concealed by the allowance of that extra year in the grades for possible late entrants, when such are so few as to warrant no such allowance.

AN ACHIEVEMENT CAPACITY TEST: A PRELIMINARY REPORT.¹

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A problem of considerable practical importance and of decided scientific interest is the evolution of a standard system of testing and examining delinquents and others for classification on the basis of their mental status.

Two requisites are a group of psychological tests and a satisfactory method of scoring which shall be generally acceptable to alienists and others seeking to differentiate high-grade defectives. It is essential to include in any comprehensive group of psychological tests to be applied in the classification of defectives among prisoners an adequate test for the function called will, since the success or failure of individuals depends so largely on the ability to endure and to continue to strive for the sake of achievement and in spite of fatigue and discouragement. In short, it is of vital importance that we measure "desire for achievement."

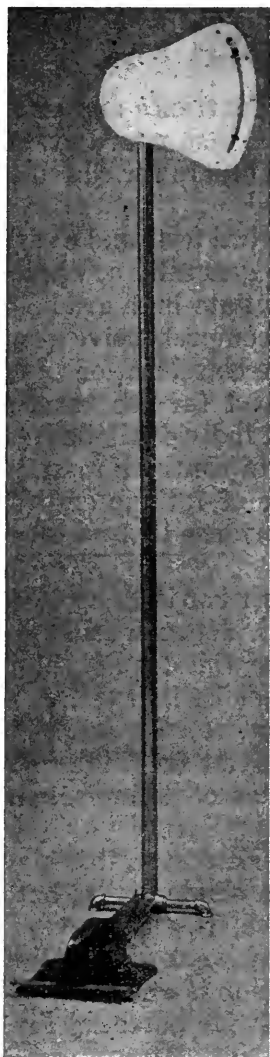
While the principal quality included in what is to be measured is so-called will, pluck, spunk, sand, determination, endurance or persistency, in any exercise of this faculty, other mental functions are involved, and cannot be ignored, *e. g.*, courage, faith, judgment and appreciation of stimulus. The very fact that language is so rich in synonyms for this mental quality is an indication of the current notion of its importance and of its complexity as well.

In considering any test for this mental character, it is clear that the attribute to be measured is not a single entity, but a state of mind or function-complex, which, to the degree it inheres, makes for success, but which, if weak or wanting, makes for incompetence. Since this function is an expression of mental energy, it should be measured in its potential form

¹Read before the American Psychological Association at Washington, D. C., December 27, 1911, under the title "A Kinetic Will Test."

and in terms of work done, *i. e.*, we should measure voluntary endurance of discomfort, pain or fatigue. Units or increments of pain are not easily measured. But it is practicable to measure in terms of muscle fatigue and units of time the kinetic will of subjects who stand supporting their weight with their heels off the floor, since fatigue is rapidly, naturally and harmlessly induced in this manner.

Our apparatus, as the cut shows, consists of a plate upon which the subject stands, facing an upright of a height of about 5.5 feet. Pivoted on the plate at a suitable point is a stiff wooden lever, furnished at the end of the short arm with a cross-bar on which the subject's heels rest, and connected at the other end by a thin wire to the short arm of a needle about 25 cm. long, pivoted at a point near the top of the upright, so as to oscillate in a vertical plane behind a suitable dial in which is a fenestrum 20 cm. long. This cross-bar exerts upon the heels an upward pressure of 20 gm. A weak coil-spring is introduced at a suitable point to maintain tension in the connecting parts. The proper adjustment of the lengths of lever arms enables a tenfold multiplication at the needle of the movements of the subject's heels. An electric bell is so arranged that it sounds a warning if the subject's heels sink to the floor level. The movements of the needle point up and down indicate to the subject at every moment the relative position of his heels, and spur him on in his at-



tempt to maintain his position and not allow the needle to fall below the "dead line" set for the standard.

The use of the apparatus will be still clearer from the directions given to the subjects. Since the degree of effort they might put forth depends partly on their clear understanding of the conditions of the test, and still more on the degree and form of appeal made to their pride and desire to excel, these directions are particularly important, and I reproduce them here in their entirety:

"I have tried your memory and your skill with the weights, etc., all short tests. Now, this is one of that takes considerable time if one does it well. I find that there is a great difference in the will-power of different people. Some give up easily, and some don't give up easily, but keep on with what they set out to do even if they are very tired. You've seen firemen work when they were all tired out, haven't you? And you've seen men playing football when they were about all in; but they kept on. They didn't give up easily. A man wouldn't stay on a football team long if he gave up when he was tired, would he? Now, I want to see how long you can keep going when you are tired. You want to see that, too—to see how well you can make good, even when you want to quit very badly. To try that, I have to make you very tired. I could do that by asking you to shovel sand or lift weights till you were too tired to do more, but there is a much shorter way than that. One gets tired very quickly by standing with his heels off the floor, and it doesn't harm him any either. In five minutes after stepping off the plate you'll feel comfortable again, no matter if you ache badly just before stepping off. The little black disc will show you when your heels are near the floor. If your heels touch the floor, you must stop. So be careful. To warn you I have placed these marks on the dial, and you should keep the little black disc between them. The safest way is to keep it midway between them. If, however, you accidentally let it pass either of the marks, you need not stop your trial, for you have three chances to do that before you must stop on that account. So you must step off the first time your heels come down on the floor, *i. e.*, when the bell rings or the third time the little black disc passes either mark. If you should begin to

lose your balance, you may steady yourself by resting your thumb and finger on the upright for a moment, but without putting any weight on it. You are given these chances so that when you have finished the test you may feel that you did not stop because of any accident, but because you had to give up. Now take all the time you want, and if your record is a good long one, it will show how well you can make good even when tired. This test is to show me and show you, too, whether you are a quitter or a stayer."

The test has been applied to 116 Reformatory prisoners and to 12 members of the senior class in the Rindge Manual Training School of Cambridge, Mass. Physically, the two groups of subjects show rather close resemblances, though the prisoners are of a sturdier type on the whole and average nearly a year older (18.42 vs. 19.33), and 4.13 pounds heavier. Intellectually and morally, the status of the prisoners is apparently inferior.

The scores from the application of this test to these two groups show a remarkable disparity between the lowest and highest of each group, as well as a remarkable disparity between the averages, *i. e.*:

- Reformatory group: lowest score, 2 minutes and 30 seconds.
- Normal group: lowest score, 12 minutes.
- Reformatory group: highest score, 52 minutes and 45 seconds.
- Normal group: highest score, 2 hours, 30 minutes and 6 seconds.

Median and average of the groups are:

- Reformatory group: 14 minutes and 54 seconds.
- Normal group: 36 minutes.
- Reformatory group: 17 minutes and 18 seconds.
- Normal group: 52 minutes and 30 seconds, respectively.

The average score of the normal group is, then, more than twice that of the group of prisoners. Such a result clearly gives two important indications, *viz.*, (1) that this test is an index of mental quality rather than of a degree of physical strength, and (2) that the superiority of the normal group in this mental quality of kinetic will is shown to be not only measurable, but remarkable in degree, notwithstanding the fact that the physical advantages are decidedly in the prisoners' favor. In fact, none of the other 11 psychological tests

applied to these groups by the author has shown so positively the deficiency among prisoners of those mental characters which make for success.

DISCUSSION.

Mental persistence may not be measured in terms of physical fatigue unless there be a safe margin of unexpended muscular power after the mental persistence yields. Experience in applying the test to 128 subjects shows that in every case the decision to "give in" preceded the necessity of it. Several remarked, "Well, that's enough for me," or "I'm about all in, I guess," before they actually yielded. Some were asked if they could not have made a better record if they tried, and all of them answered in the affirmative. In no case did the heels sink to the floor while the subjects still vainly strove to maintain their elevation. So the test is valid for mental persistence to the limit of the subject's capacity.

A few subjects who did fairly well in other tests made low scores in this test, *e. g.*, 4.5 minutes instead of the Reformatory average of 17 minutes and 18 seconds. One of these subjects volunteered an excuse of lameness, but he did not limp as he left the building. Another freely admitted he could have stood longer, but said in reply to a question, "There was nothing in it for me." This brings out one of the most valuable features of the test. In a few cases of subjects who apparently did not try to secure a high score in this test, the low score is a reflection of their whimsical judgment, of inability to appreciate the significance of opportunity or of indisposition to sacrifice comfort for achievement; in any case, a measure of elements of failure. None of these cases occurred in the normal group. The spirit of appreciation and aggressiveness shown in this test, or the lack thereof, seems to be an index of the subject's capacity to meet competition, so far as any one test may be such.

The disturbing effect of varying body weight and of varying degrees of muscular strength nearly or quite neutralize each other in this form of the test, because of the closeness of relationship between the strength and development of the group

of muscles involved in carrying the weight of the body and the body-weight—a closer correspondence between power and weight than can be found in the case of any other muscle group.²

Previous training is not a seriously disturbing factor for groups of prisoners who have daily drills in open-air calisthenics and who work all day in shops and trade-schools and attend school in the evening, nor for manual training school students whose age, sex and daily routine are strikingly similar.

This test is one of the few which are independent of the language factor, and therefore available for universal application.

The value of this test as a measure of intellectual efficiency may be judged when one compares the broad, inclusive mental horizon of the intellectually competent with the narrower, less well-furnished one of the defective. The mental horizon of the former contains a greater number and a higher order of possible reactions to a given stimulus. It is conceivable that the stimulus that was given might arouse in the dull defective only an uncritical willingness to accede to the doctor's request, while the alert, aggressive, normally-equipped subject might react to the same stimulus by asking what the other fellows have done, or, recognizing the procedure to be a mental test, by a silent determination to show that he has as strong a will as anyone. The subject who can react well to worthy motives and act understandingly will sacrifice more for realization than the subject actuated by less worthy motives. So it seems clear that this test affords an available means of measuring those mental qualities or forces which make for success in competition.

²The coefficient of correlation of weight and achievement capacity for the group of 100 is + .04, which shows that though the heavier subject tends to persist a trifle longer in the test, the tendency is so small that the validity of the test does not suffer thereby.

COMMUNICATIONS AND DISCUSSIONS.

THE BINET TESTS AND MENTAL ABILITY.

Dr. Seashore's suggestion that tests of special kinds of ability be worked out as an extension of the Binet tests may imply that they do test general mental ability. If by general mental ability is meant something analogous to a test of strength or skill, I do not believe that the Binet tests or any other tests likely to be devised within the century will serve as a reliable measure.

A test of the kind of mental ability a child has is, however, possible, and it is as such a test that the Binet scale is valuable in determining mental age. The physiologist can judge with considerable accuracy the age of an individual by the texture of his bones and muscles, the proportion of parts and the kind of motions he makes much better than he can by weighing, measuring or testing strength or rate of movement. In a similar way the psychologist may hope by means of the Binet tests (improved) to determine with considerable accuracy the mental age of children and feeble-minded adults.

This determination of whether a person is normal, retarded or accelerated in his mental development is not a test of mental ability in the sense of indicating how successful he will ultimately be in any line of intellectual effort, but is only an indication that the mode of intellectual activity is of the more or less mature type. For example, mental maturity is indicated not by the number of concepts that a child has, but the character of the concepts and the kind of definitions he gives in explaining them. Attention is called to this because in giving the Binet tests and in improving and interpreting them this truth needs to be borne in mind, or we shall be led into a search after tests of general mental ability in the sense of degree of power.

E. A. KIRKPATRICK.

Fitchburg, Mass.

ABSTRACTS AND REVIEWS.

ROBERT M. YERKES. *Introduction to Psychology*. New York: Henry Holt & Co., 1911. Pp. xii, 427.

This book differs in important respects from the ordinary introduction to psychology. In the initial chapter, which, as the author dryly remarks, "contains prefatory material, but is not called a preface, because it is intended to be read," two kinds of textbooks are distinguished—the outline and the manual. The outline aims to give a bird's-eye view of the subject; the manual sets forth the facts in detail. The outline permits a more vivid, personal, tentative presentation, while the manual must be more formal, general and impersonal. The author holds steadfastly to this conception of the outline throughout the book, and thus gains a freedom of treatment and a vigor of emphasis which give a distinct zest to the discussion, though they may often provoke dissent.

The work is divided into six parts. Part I is introductory, and deals with the aims, problems, methods, values and ideals of psychology. Not only is introspection emphasized as the fundamental method of psychological study, but here at the outset, as again and again throughout the book, the pupil is led to feel by indirect suggestion that skill in introspection is the one thing supremely to be desired; that its acquisition depends on one's own efforts; and that if one fails to acquire it one has missed something very much worth while in life. Part II treats of the description of consciousness, and shows that the psychologist's task is to analyze mental life into its simplest thinkable parts or elements, to discover the characteristics of these elements, and to show the relations that subsist between them. But with analysis and description the psychologist's work is not finished. Following Wundt, the author demands that the isolated elements be recombined into concrete thought wholes, and, making extensive use of an analogy from chemistry, he insists that synthesis is just as important a part of the psychologist's duty as analysis. It is true that this is presented rather as an ideal for the future than as a claim for the present status of the science, and the reviewer

believes that it might even be disputed whether a synthesis of elements is strictly possible in any science; whether all science is not exclusively analytic. However this may be, the author has performed a service in raising the question and setting forth the arguments in favor of synthesis.

Part III contains two brief chapters on the development of consciousness in the individual and in the race. The diagram representing the psycho-phylogenetic tree gives the pupil an excellent conception of the relations of the animal phyla from the point of view of their mental development. In Part IV a number of the important generalizations of psychology are presented in the form of brief, dogmatic statements, which are called laws. It is carefully pointed out at the beginning of the discussion that the generalizations of science are incomplete, and that further investigation may show that many of these laws need re-statement. Those who have had much experience in teaching psychology to beginners will probably agree that there is a distinct advantage in having some such list of definite formal statements to aid pupils in organizing the mass of details with which they frequently find themselves overwhelmed.

The title of Part V is Psychology as Explanation and Correlation, and it is here that the author develops his fundamental psychological creed. Emphasizing the orderly succession in mental life, he not only rejects interaction between mind and body, but claims for consciousness a psychic causality which is every whit as valid as the relation of cause and effect between physical phenomena. A complete description of consciousness would reveal the causal connections between our thoughts, and the primary duty of the psychologist is to explain each mental fact in terms of its psychic antecedents, or causes. Any attempt at explanation by reference of mental phenomena to physical changes or neural activities does not explain at all, but only serves to becloud the issue and confuse the student. Hence all reference to the nervous system is purposely omitted. The question of the relation between mental and physical facts is an interesting and important one, but should be left to the psycho-physicist, and especially should not be brought in to mislead the beginner. It is somewhat surprising to find one who has made such extensive contributions to comparative behavior taking the extreme stand that psychology is limited to pure introspection, and ruling out all study or interpretation of behavior. Moreover, in Part VI it is admitted that we can control the trend of

our thoughts only by controlling the environmental influences that act upon us as organisms, and the concluding chapters of the book, on education and eugenics, discuss the conditions of such control. Further, the orderly sequence of mental facts, upon which the claim for psychic causality is based, seems to depend upon the exact re-statement of physical conditions. Thus the author himself finds it impossible to hold strictly to a purely psychic explanation.

Probably the chief function of an introductory textbook is to induce the pupils to think. This the present book will certainly accomplish. The style is terse and vigorous, the sentences short and easily grasped, and the class exercises that follow each chapter are admirably chosen to stimulate introspection.

J. C. B.

ERNEST JONES, M.D. *The Psychopathology of Every-day Life.* American Journal of Psychology, 22: October, 1911. Pp. 477-527.

This article presents material similar to that cited in Freud's study of like title. In our every-day life we frequently note what might be termed imperfections in our mental functioning. We fail to do just what we intend to do, or we do other things which we do not intend to do. These inadequate or seemingly purposeless acts usually go unexplained, or are merely attributed to chance and accident. The author argues that there is no chance and accident in mental operations. On the contrary, determinism prevails in even the most trivial bit of mental functioning. Psycho-analysis shows that the performances in question have been determined by motives or factors of which we were not aware during their occurrence. The mechanism underlying them, therefore, is similar to that which underlies, according to Freud, the more serious disturbances of mental life, like hysteria and allied neuroses, which are truly pathological.

The deficiencies described in the present article are such as slips of the tongue, slips of the pen, symptomatic acts, certain failures to perceive or to remember, as well as false perceptions and false recollections. An unconsciously operative repressed wish or motive is assumed to condition these deficiencies, whether directly or indirectly. The appreciation of these every-day errors is important, both practically and theoretically, for the understanding of the way in which decisions and judgments are formed and for the evidence it affords of thoroughgoing psychical determinism.

Cornell University.

HENRY MAYER.

H. H. SCHROEDER. *The Psychology of Conduct*. Chicago: Row, Peterson & Co., 1911. Pp. 287.

An unusually well-written and well-informed book, intended primarily for young teachers and eminently well adapted to reading-circle purposes. The writer does not approach his problem from the point of view of the positive sciences, nor has he much sympathy with the experimental study of education. "Highly valuable as such experimental efforts are, it is best to leave them to the specialists who are qualified to pursue them and profit by them, and for the rest of us to act upon such educational theory as has stood the test of time." The citations are consequently limited almost exclusively to the classical writers in the fields of philosophy and theology. Conduct "regard:" regard for self, regard for others, regard for knowledge is determined by motives which can be reduced to certain types of and truth, regard for the beautiful, regard for right and duty, and religious regard. The educational implications of each of these types are treated in separate chapters. The writer is teacher of psychology and pedagogy in the Whitewater (Wisconsin) State Normal School.

W. C. B.

EDWARD A. FITZPATRICK. *The Educational Views and Influence of De Witt Clinton*. New York: Teachers College, Columbia University, 1911. Pp. xii, 157.

The author reaches the conclusion that Clinton is, of those whose work is finished, "perhaps the greatest theorist whose name will be recorded in the future adequate history of American education, with the exception of Dr. William T. Harris." Among the bases for this conclusion are the following facts: Clinton's pioneer work in the development of free, public schools in New York City; his initiation and support of the movement for the effective professional preparation of teachers; his advocacy of the education of women; his recognition of the need for special education of defectives; the construction of a system of juvenile reformation, and his advocacy of an enriched curriculum which would include instruction in mechanics, chemistry, agriculture and other subjects. Dr. Fitzpatrick's dissertation is an illustration of the thorough-going monographic work which is so sadly needed in the history of education.

W. C. B.

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EDITORIALS.

In the sixth annual report of the Carnegie Foundation for the Advancement of Teaching President Pritchett comments favorably upon the progress recently made in securing a better adjustment between the college and the high school. On the one hand, in the decade 1900-1910 one hundred and seventy-two colleges and universities in thirteen representative states raised their entrance requirements to or toward a four-years' high school course. Such action lends dignity to the high schools and increases the importance of their work. The ambitious student who desires to go to college finds that even the smaller institutions expect him to have completed four years of good work in the high school. An incentive is thus offered to the high school to plan and carry into execution some genuinely constructive work in the education of those who later will presumably occupy influential positions in their communities.

On the other hand, there has been a growing disposition in the last few years on the part of the larger and older institutions to give up their rigid systems of examination, which have heretofore worked to the advantage of the tutors and the special preparatory schools, and to meet the high school graduate on the ground of his own preparation, requiring merely that this preparation shall have included a certain number of units of work in which the candidate shall be able to show some proficiency. President Pritchett takes Harvard as an example.

"Graduation from a good general four-year high school in any state admits directly to Harvard College, provided the applicant can demonstrate in a reasonable test that he has really done the work which his high school course covers. It is in the preparation of these examinations that the chief difficulty will arise. * * * American teachers have so long accustomed themselves to the hard-and-fast form of examination in a limited field that it may require some experience before the Harvard teachers will produce examination papers fitted to test the qualities of the boy's mind and the character of his scholarship rather than the excellence of his drill in specific studies." Of the 115 candidates who took these new examinations in June, 1911, 72 were admitted and 43 rejected. "The large number of rejections showed the wide variations in standards of scholarship in different schools. Boys whose school records were very high sometimes made a very poor showing in the examinations. It will require, among other things, a stiff academic backbone on the part of those who administer these admission examinations, if the plan is to succeed; but Harvard can do no better service to education than to send back fearlessly to the high schools those applicants for admission to college who present good credentials in English, and yet cannot write the language correctly; who have high marks in mathematics, and yet cannot solve a simple problem in algebra; who present flattering papers in history, and yet know nothing of the forces of civilization which make history. No other thing that an American college could do at this moment compares in importance with this task well done. Harvard has now made it possible for any boy in any town or village in the Union, where a fair high school exists, to fit himself for entrance to college. Harvard College thus articulates squarely with the secondary school system of every state in the Union. The adoption of this policy is an act of true educational statesmanship. It is of immense importance to education that the university carry out the plan courageously and wisely."

It is true that the preparation for college is only one aspect of the high school's task. It must also take account of the large number of pupils who will never go to college. But such an adjustment with the college will increase the respect in which the high school is held by the community, will result in a saner and more comprehensive grasp of the subjects that are taught in the high school.

will serve to lessen the gap between preparation for college and preparation for life, and will cause greater emphasis to be laid on what should be the aim of all high school work—the intellectual development of the pupil.

J. C. B.

We are evidently destined to be invaded by the "House of Childhood" movement. It is rumored that a chain of training schools is contemplated which shall enable teachers in any region of the country to receive instruction in the Montessori system. Meanwhile, the materials that are used in the system are placed on sale by an incorporated agency in New York City. From the circular distributed by this concern we learn that "the Montessori Didactic Apparatus has been patented, and other patent applications are pending: *Infringers and imitators will be vigorously prosecuted.*" The italics are not ours, but those of the "House of Childhood."

Now, to a mere pedagogue, unversed in the intricacies of patent law, it is a little difficult to understand what exactly can be patented in this new (?) system. The materials comprise such familiar devices as colored worsteds, cubes of varying sizes, "geometrical insets" (which are variations in the well-known form-board), sand-paper letters (which are rather clumsy substitutes for the raised letters used in institutions for the blind in teaching the form of written letters), boards smoothed and covered with sandpaper, and several similar devices which are, again, as common-place in our schools for training defective children as spelling-books in a primary school. Can ideas long in common use be patented and users of them prosecuted? Can materials familiar in any school be given a slight modification in detail and then patented? Is there anything really new in this Montessori system?

These queries we shall not attempt to answer, but one thing is clear enough. This commercialization of the "system" removes it entirely, in spirit at least, from the realm of scientific contribution to educational progress. If Montessori has discovered a new and far-reaching principle which will reconstruct the whole theory of child training and which will directly benefit the children in every land, then let the discovery be disseminated freely to all who will employ it. To patent a scientific contribution of that kind would

be on a par with patenting the discovery of ether or of antiseptic surgery. In our humble opinion it is time to develop a new and higher standard of ethics in the teaching profession. G. M. W.

The relative place of consciousness and freedom as opposed to automatism in our educational aims may be illustrated by the familiar act of the boy tipping his hat to ladies. Consciousness and freedom are temporary affairs which

**THROUGH CONSCIOUSNESS
TO AUTOMATISM.**

come in only at points of new adjustment; the goal is automatism. When the boy is to learn to tip his hat, we want him free to warm up over the fact that the tipping of the hat is a sign of good breeding; that it is an honor to himself and parents, and to the person greeted; that it gives a delightful feeling of satisfaction in power and self mastery; that it goes well with a smile and a compliment; that it brings returns; that it is a means of relieving pent up energies by knowing how to dispose of the hands; that he can thereby actually express individually his appreciation of the person greeted; that tipping the hat is not that trifling physical act only but, when properly done, is the entering of one mind into relation with another; that this little act of manners is laying the foundation for the man; that if he does this with all his heart he will acquire the power to do greater things with the same ease. This implies ability to hesitate and size up the situation in his own mind; it means willingness to cope with instinctive cravings; it means willingness to fight single-handed for personal adjustment. And all this tends to throw him into an attitude of profoundest consciousness of this act for the time being. At this beginning of a new adjustment, we want him free to think, feel and act with the profoundest consciousness. But as soon as he learns to tip his hat we want that process to take care of itself, to be automatic, so that he performs the act on every appropriate occasion without hesitation and without thinking, but with the fullest richness of significance. Only in this way will his consciousness be free for new operations, for the making of new adjustments, while the adjustments once made through the most strenuous consciousness are now self acting. C. E. S.

NOTES AND NEWS.

The Committee of the American Psychological Association on Class and Home Experiments has printed in preliminary form directions (both for teachers and students) for conducting a class experiment in habit-forming. Teachers who are members of the Association and who will report the results of the experiment, may obtain sets for trial by writing to Professor G. M. Whipple, Cornell University, Ithaca, N. Y., before August 1st. Request for the forms should indicate the number of students in the class.

Among the lectures recently delivered before the *School of Psychology*, 49 Rue Saint-André-des-Arts, Paris, were the following: "Diseases of Instinct," Dr. Berillon; "The Psychology of the Buyer," Dr. Moride; "The Education of the Eye: Visual Memory and Visual Imagination," Lucie Berillon; "Hypnotism and Mental Orthopedics," Dr. Berillon; "The Intelligence of Animals," Dr. Moret; and "The Psychotherapeutic Treatment of Diseases of the Will," Dr. Joire.

On November 4, 1912, there will be opened in Brussels an International School of Paidology, in affiliation with the *École Supérieure des Sciences Pédologiques et Psychologiques*. The school is the outcome of a movement started at the First International Congress of Paidology, which met at Brussels in August, 1911, for the establishment of a graduate institution which should offer advanced training commensurate with the development and specialization of our knowledge about the child. It will be an institution for research as well as for instruction, and the three-year course will lead to the degree of Doctor of Paidological Science. Courses will be offered by distinguished Belgian and foreign specialists in theoretical and practical paidology, experimental psychology, anthropometry, school hygiene, history of education, "puericulture," experimental pedagogy and didactics, physical education, infantile sociology, abnormal childhood, and other subjects. The school will have at its disposal four laboratories: One for paidology, one for experimental psychology, one for physiology and anthropometry, and one for biological chemistry. The undertaking is noteworthy for its attempt to bring together under one faculty the various scattered lines of child investigation. Further details may be secured on application to the director, Dr. I. Ioteyko, 35 Avenue Paul de Jaer, Brussels.

The bill creating a United States Children's Bureau, in connection with the Department of Commerce and Labor, has been passed by Congress and approved by President Taft.

The Mississippi legislature has passed a bill appropriating \$126,000 for a new state normal school.—*Western Journal of Education*.

Among the courses announced for the coming year by the School of Education of the University of Kansas we note with special interest a course in educational pathology with visits to institutions for defective children, a course in vocational education, one in social education, one in experimental education, one in the mental measurement of school children, and one in school hygiene. To increase the influence of the School of Education throughout the State several Departments of School Relations have been organized, among which are high school relations, relations of elementary to secondary education, and school hygiene, including mental and physical tests, and medical inspection.

Allegheny College has increased its endowment by \$500,000. A part of this will be used in building up a department of education. One new chair will be created, the T. D. Collins professorship of philosophy and education, and several instructorships and assistant professorships are planned.

The New York City board of education has voted to grant a limited number of experienced elementary school teachers leave of absence for three months in order that they may fit themselves to take charge of the special classes organized for defective children, and has authorized the establishment of a course in the Brooklyn Training School for Teachers for the training of teachers for such special classes. This is believed to be the first instance of a city definitely training its teachers for this kind of work.

The Mechanics Institute, of Rochester, N. Y., offers an attractive list of courses in the manual arts during the summer session, June 24 to August 16. The Institute is especially well equipped for shop work, the applied arts, as jewelry, leather work, metal work, pottery, weaving, etc., and the domestic arts, as dressmaking, millinery, sewing and cooking.

The executive committee of the National Education Association has decided that the next meeting of the Association will be held in Chicago, July 6-12, 1912.

Among the resolutions adopted by the Kansas State Teachers' Association at their last annual meeting was one calling for specific instruction in the high school in such subjects as hygiene, sanitation, and the prevention of disease. Another resolution advocated the appointment of a State inspector for rural schools. The need for definite instruction in sex hygiene was recognized, and it was urged that this duty be accepted as one of the responsibilities of the teacher and school administrator. In view of the increasing attendance of teachers in summer schools in the month of July, the directors of

the National Education Association are urged to change the date of their meeting to August.

It is stated in the daily press that the school board of Philadelphia has abolished all fraternities in the public schools, and has assumed complete supervision over the sports participated in by students.

At the last meeting of the New York Branch of the American Psychological Association, April 22, the following papers were presented: "Sex Differences in Incidental Memory," Mr. G. C. Myers; "Studies in Recognition Memory," Dr. E. K. Strong; "Individual Differences in the Interests of Children," Miss Gertrude M. Kuper; "Experiments with the Hampton Court Maze," Prof. H. A. Ruger; "Relation of Interference to Adaptability," Mr. A. J. Culler; "The Optimal Distribution of Time and the Relation of Length of Material to Time Taken for Learning," Mr. D. O. Lyon; "The Age of Walking and Talking in Relation to General Intelligence," Mr. C. D. Mead; and "Practice in the Case of Children of School Age," Mr. T. H. Kirby.

The Minnesota Psychological Conference held its fourth annual meeting at the University of Minnesota, March 29. The topic for the morning session was the Treatment and Diagnosis of Exceptional Children. Dr. F. Kuhlmann discussed the Binet Scale, Miss Eunice Peabody reported on the Recent Literature on the Binet Tests, Mrs. Marie C. Nehls spoke on the Binet Tests and Juvenile Court Work, Supt. F. E. Lurton discussed his Study in Retardation, which appears on another page of this issue, and Mr. Hans W. Schmidt considered the Exceptional Child and Special Schools. Among other papers at the afternoon session was one by Mr. L. W. Kline reporting the results of an investigation on the Psychology of Spelling, the detailed account of which will appear in the September number of this JOURNAL.

A conference was recently held at New Haven between the examiners of the academic department of Yale University and a body of eighteen educators appointed by the State Association of Classical and High School Teachers, and representing the high and private schools of Connecticut. The conference made a careful review and criticism of recent entrance examination papers, and the result will probably be the modification of future papers in many particulars, and perhaps the joint preparation of such papers by teachers and examiners.

Under the auspices of the University of Pittsburgh a conference was held on April 16 to consider the problem of The Backward and Defective Child. Dr. Edward E. Mayer introduced the subject, Professor J. E. Wallace Wallin discussed The Psychological Clinic,

Superintendent S. L. Heeter spoke on *The Abnormal Child in the Public Schools*, Dr. J. Leonard Levy presented the advantages of *The Farm for Backward Children*, and Dr. E. Bosworth McCready described the *Hospital School for Backward Children*.

On April 24 there was presented at the College of the City of New York a symposium on the subject "The Training of the High School Teacher." Addresses were made by Associate Superintendent Edward L. Stevens, "What the Board of Superintendents Wants"; Dr. Walter L. Hervey, "The Viewpoint of the Board of Examiners"; Principal John H. Denbigh, "The Viewpoint of a High School Principal"; Professor Frank W. Ballou, of the Commission on School Inquiry, "The Viewpoint of an Investigator"; and Dr. John Franklin Brown, "What Germany Can Teach Us."

The fifth annual Congress of the *Deutsche Gesellschaft für experimentelle Psychologie* was held in Berlin, April 16-20. The meeting was attended by eminent experimentalists from all the leading countries of the world, and gave a good indication of current psychological activities. Through the kindness of Dr. Wilhelm Peters, of the University of Würzburg, we hope to be able in an early number to give our readers a more detailed account of those discussions of the Congress which have a bearing upon education.

The second International Congress for Moral Education will be held at The Hague, August 22-27, 1912. A very attractive program has been prepared, including speakers from not only the principal European countries, but also from Turkey, India and the Far East.

Professor G. M. Whipple, who has been granted a half-year's leave of absence from Cornell University, will sail for Europe with his family directly after the summer session and devote five months to visiting educational institutions in France, Belgium, Germany and Switzerland. Professor Whipple will spend the greater portion of his time in Germany at various university centers, particularly Hamburg, Leipzig, Berlin and Breslau, getting in touch with recent developments in applied and educational psychology.

Dr. J. E. Wallace Wallin, recently appointed director of the psychological clinic at the University of Pittsburgh, is arousing a great deal of local interest in the study of backward children. The *Pittsburgh Sun* devotes considerable space to a discussion of the aims of the clinic and the various ways in which it can be made of greatest use to the community, emphasizing the mental examination and diagnosis of exceptional children, the training of teachers and social workers in the best methods of dealing with abnormal children, and the opportunities for research with mental defectives.

Professor W. C. Bagley, Director of the School of Education of the University of Illinois, delivered a number of lectures on educational topics at Wheeling, W. Va., and Zanesville, O., in the last week of April. On May 11 Professor Bagley addressed the assembly of Cook County teachers in Chicago.

On May 1 Dr. Anna J. McKeag, formerly head of the department of education in Wellesley College, was formally inaugurated president of Wilson College, Chambersburg, Pa. Among those participating in the ceremonies were Provost Edgar F. Smith, University of Pennsylvania, President Ellen F. Pendleton, Wellesley College, and Chancellor Elmer Ellsworth Brown, New York University.

Professor W. C. Ruediger, of the George Washington University, will give ten lectures before the students of the summer session of the St. Louis Teachers College during the week of June 17. Among the topics that he will discuss are Realness in Teaching, Education and Avocation, and The Improvement of Teachers in Service.

"The Psychology of Child Development," by Professor Irving King, of the University of Iowa, has been translated into Japanese.

During the summer quarter the departments of psychology and education of the University of Chicago will have the assistance of the following instructors from other institutions: Henry C. Morrison, State Superintendent of Public Instruction, New Hampshire; Dr. Frank Pierrepont Graves, professor of the history of education, Ohio State University; Dr. Arthur H. Sutherland, instructor in psychology, University of Illinois; and Dr. Evander Bradley McGilvary, University of Wisconsin.

Dean C. H. Johnston, of the University of Kansas, gave three lectures on "Problems of Secondary Education" before the School of Education, University of Illinois, April 29th and 30th.

President Charles Oliver Merica, of Wyoming State University, has been recently elected superintendent of the State Training School for Boys in Red Wing, Minnesota.

Charles McKenny, for the past twelve years president of the Milwaukee, Wisconsin, State Normal School, formerly at the head of the State Normal School at Mt. Pleasant, Michigan, has been elected president of the Michigan State Normal College to succeed President L. H. Jones, who retires at the close of the present year.

J. E. McGilvrey, who has been acting president of the Macomb, Illinois, State Normal School since the death of President Bayliss last year, will become president of the Kent, Ohio, State Normal School on July 1.

Superintendent H. B. Williams, of Sandusky, Ohio, has been elected president of the new State Normal School to be established at Bowling Green, Ohio. President Williams will enter upon his work in 1913.

Dr. J. Carleton Bell, director of the psychological laboratory in the Brooklyn Training School for Teachers, has been appointed professor of the art of teaching in the University of Texas. Dr. Bell expects to devote his attention largely to the experimental investigation of problems of teaching.

Professor Frederick E. Bolton, professor of education and director of the school of education in the State University of Iowa, has accepted a call to become head of the department of education in the State University of Washington at Seattle, and will begin his work at that place in September.—*Science*.

Dr. John E. Clark, instructor in history and philosophy, Boston University, has been promoted to a professorship in education and public school administration in that institution.

Mr. William A. Cook, of the University of Illinois, has been appointed graduate fellow in education in the University of Wisconsin for next year.

Dr. Ira W. Howerth, Dean of University College, University of Chicago, has been appointed professor of education and director of university extension in the University of California.

Mr. Linus W. Kline, of the Duluth, Minnesota, Normal School, has been appointed research fellow in psychology in Harvard University for next year.

Dr. Amos W. Peters, of the Carnegie Food Laboratory in Boston, has been appointed biochemist in the research department of the Training School for Feeble-minded Children, at Vineland, N. J. So far as is known this is the first appointment of the kind ever made. Dr. Peters will carry on studies in metabolism and brain chemistry.—*Science*.

Dr. William S. Skarstrom, assistant professor of physical education at Columbia University, has been appointed professor of the theory and practice of physical education at Wellesley College. Dr. Skarstrom will take charge of the "normal courses" in the Wellesley department of hygiene and physical education, formerly the Boston Normal School of Gymnastics.

CURRENT PERIODICALS.

(In this section only such articles will be noticed as bear directly or indirectly upon the interests of this journal.)

THE CHILD (London). Vol. II, No. 4, January, 1912. JOHN LAMBERT, M. D. *Preparations for the Prevention of Dust in Schools.* 279-289. Dust menaces health by direct pathogenic infection and by mechanical irritation, the latter being more serious in the schoolroom. All schoolrooms should be provided with foot scrapers, wire and fiber mats at the entrance; the floors should be swept daily and scrubbed at least once a month. Of the newer methods of reducing dust, floor polishes, sawdust substitutes, vacuum cleaners, and oil preparations, the last named is most efficient. Experimental evidence is given (exposure of gelatine and agar plates) to demonstrate that dustless oils retain dust particles that fall upon them and greatly reduce the amount of floating dust during sweeping. MISS A. H. P. KIRBY. *The Problem of the Feeble-Minded Child.* 290-8. Description, with illustrations, of the work of the "Princess Christian's Farm Colony" in Kent, and history of the development of other Farm Colonies. The English authorities have provided for about 10,000 children in special schools and classes, but about 35,000 remain to be provided for. Realizing that education will never effect permanent betterment, the National Association for the Feeble-Minded strives to follow up the work of the educational classes by a system of After-Care Centers. "To protect the feeble-minded from the results of their own defects, and to protect society from their deficiencies, must mark the limits of our ambition." ISADOR H. CORIAT, M. D. *Psycho-Analysis and the Sexual Hygiene of Children.* 299-304. A simple account of Freudian principles—infantile sexuality, infantile amnesia, repression, the growth of psycho-neuroses, the psycho-analytic method. Urges rational early sex instruction with wise efforts at sublimation. G. NORMAN MEACHEN, M. D. *The Prevention and Cure of Chilblains in Children.* 305-8. Underlying factor is poor circulation. Secondary factor, the action of cold upon an exposed part. To prevent, increase the fat constituents of the diet to supply more bodily heat, avoid washing hands or feet in cold water, take exercises to quicken the circulation, wear woollen gloves and stockings and heavy shoes. Formulas are appended for local treatment by drugs. JOHN PRIESTLEY. *Medical Inspection in Schools: The Next Step.* 309-313. Argues that most school ailments are chronic, that incipient maladies are rarely found by the school inspector, hence oft-repeated inspections of all children are futile. An ideal system would include (1) a rough examination on first admission, (2) a thorough examination at 8

years of age, (3) a final examination when leaving school, and (4) visitation of the school once in three months. A. S. COBBLEDICK, M. D. *Refractive Errors in the Eyesight of Children*. 341-4. Brief statement of frequency, symptoms and treatment. Gives some account of arguments for and against "school myopia," and admits that the cause of myopia "is still somewhat obscure." Vol. II, No. 5, February, 1912. DOUGLAS C. MCMURTRIE. *The Care of Crippled Children in America*. 378-385. A general sketch, dealing with the requirements of crippled children, their care in residential and in non-residential institutions. Thinks provision is as yet only sporadic, while the institutions have not profited by interchange of experience. ISABEL D. MARRIS. *The Making of a Hooligan*. 386-391. Lack of "discipline," in the wide sense of that term is the main factor in developing the wayward individual, who may be "spoiled" in a rich as well as in a poor home. Legislation will not remedy this social evil unless we can create proper public opinion and moral atmosphere. J. COURTENAY LORD. *Children's Courts*. 392-5. The author established the children's court in England, 1905. Describes work and results of the court at Birmingham. Concludes children's courts, "if thoughtfully and sympathetically managed, form the groundwork upon which a great social improvement can be built up." JOHN H. YEARSLEY. *Injuries to the Eye in Childhood*. 396-8. Elementary advice for prevention of eye injuries to children, treatment of foreign bodies in eye, burns, and sympathetic ophthalmia. ROBERT J. EWART, M. D. *Mankind in the Making*. 399-404. Attempts by statistical inquiry to find at what ages, at what intervals and at what seasons a mother should bear children to secure their optimal physical and mental development. Concludes that there is a "reproductive plateau" (21 to 40 years) best suited to child-bearing, that "spacing" should average three years, number of children should be limited to five, and pregnancy should begin in May. Children born under other conditions than these are liable to physical and mental handicap. EMILIA V. KANTHACK DE VOSS. *Child Welfare and Public Instruction in Germany*. 405-9. German social authorities are conducting a vigorous campaign for the improvement of public health. The Central Association for Public Welfare in the Province of Hanover, with the co-operation of Invalidity Insurance institutions, circulates a pictorial leaflet, which is reproduced, to teach mothers the advantages of breast feeding. HUGH T. ASHEY. *Headaches in Children*. 426-8. Headaches are rare before the age of four or five, are commoner in nervous and neurotic children, or quickly growing children, are often the consequence of eye strain, adenoids and poor ventilation. JAMES E. WEST. *The Boy Scout Movement in America*. 429-432. Brief account of history, aims and organization. "There is every reason to believe that the Scout movement will grow and that it will become a permanent institution in America." Vol. II, No. 6, March, 1912.

ALICE M. BURN. *The Clothing of Children in Relation to Physique and Development*. 462-7. Claims that "70 per cent. of the girls, and a considerable percentage of the boys, in our elementary schools are physically victimized to their clothes." Most of the minor school defects of breathing and posture would be materially diminished by rational clothing, suggestions for which conclude the article. DAVID MCKAIL, M. D. *Eyestrain in School Children*. 468-472. Discusses nature and causes of eye-strain, assigning a prominent place to unhygienic school work. For prevention urges abolition of all book instruction prior to 8 or 9 years. EDITH H. HEWETT. *The Teaching of Deaf Children*. 473-9. The deaf child is really more handicapped than the blind child so far as instruction is concerned. He must be taught the meaning and use of *every* word. His teacher must take special pains with the "subjective" language, the colloquial expressions and the idiomatic phrases of every-day life. It is particularly important to begin instruction in lip reading and articulation at an early age, especially to utilize the years between 2 and 7. L. D. CRUICKSHANK, M. D. *Child Welfare Work in Dunfermline*. 485. Andrew Carnegie, eight years ago, gave to his native town an estate and an endowment yielding \$150,000 a year to bring "more of sweetness and light" into the lives of the townspeople. The Carnegie Dunfermline Trust is an institution which now unites his various benefactions, including a magnificent building, gymnasium, baths, library, etc. There has recently been incorporated a Physical Training College, a thorough system of medical inspection and school clinics for eye and teeth treatment, while the Civic Guild acts as a "follow-up" agency. Other activities concern musical culture, school gardening, and arts and crafts training. The institution bids fair to become the most important agency in Scotland for the training of physical training experts and medical inspectors. HALDIN DAVIS. *Ringworm*. 511-514. Some practical aspects of the treatment of ringworm, with special reference to the therapeutic value of the X-ray.

PUBLICATIONS RECEIVED TO MAY 1, 1912.

(Notice in this section does not preclude a more extended review.)

AMY B. BARNARD, L. L. A. *Talks With Children About Themselves.*
New York: Cassell & Co., Ltd., 1911. Pp. vii, 228. \$1.25 net.

This is an attempt to instruct children in anatomy, physiology and hygiene by serving up scientific facts in an anecdotal vein. The eye is the "human camera," the nervous system is "a strange telegraphic system," the brain is "the mind's precious storehouse," etc. One would not quarrel with this plan nor with the anthropomorphism which it almost inevitably entails were the details scientifically accurate. But it is questionable to say, for example, that the picture which is upside down on the retina is made right-side up in the brain, or that sounds "play" on the organ of Corti, while the account of cortical localization is nothing short of amusing—"The intellect is in the front part, the social and domestic feelings are in the back part, the selfish propensities at the sides, and the moral and religious sentiments in the upper part," "Notice what a beautiful arrangement this is," continues the author, "the intellect in the forehead above the eyes." Yes, very beautiful!

C. H. BEAN. *The Curve of Forgetting.* Archives of Psychology, No. 21, March, 1912. Pp. 45. Paper 45c.

The author studied the curve of forgetting in three types of activity: 1. Accuracy in throwing at a mark; 2. Recognition of a series of nine consonants; 3. Typewriting. In general the curve of forgetting resembles that of learning, but the absolute rate depends on the degree to which the material has been learned, the distribution or concentration of the process of learning, the nature of the material, and the method of measuring the forgetting. It is probable that young children forget more rapidly than adults.

FRANK G. BRUNER. *Bad Air and Stupidity.* Reprinted from the Educational Bi-Monthly, February, 1912. Pp. 16.

An interesting discussion of the constitution of bad air, but there is little or nothing to show its connection with stupidity.

FRANK G. BRUNER. *The Influence of Open-Air and Low Temperature Schoolrooms on the Alertness and Scholarship of Pupils.* Reprinted from Proceedings of the N. E. A., 1911. Pp. 890-898.

A description of Chicago's experiment with open-air schools.

Whether the undoubted improvement of the pupils was due solely to the open air and low temperature, or whether a good part of it might not be attributed to more freedom, lack of restraint and wholesome food, are questions which unfortunately cannot be answered from the available data.

WILLIAM E. CASTLE. *Heredity in Relation to Evolution and Animal Breeding*. New York: D. Appleton & Co., 1911. Pp. xii, 184.

A discussion of the problem of "creating" new and improved breeds of plants and animals, dealing chiefly with the operation and implications of Mendel's law. The book is clearly written and well illustrated. To each chapter is appended a list of selected references to the monographic literature.

CHARLES BENEDICT DAVENPORT. *Heredity in Relation to Eugenics*. New York: Henry Holt & Co., 1911. Pp. xi, 298. \$2.00 net.

A book of great merit that should be in the hands of every educator. Deals with the nature, importance, aims and method of eugenics, the inheritance of family traits, the geographic distribution of inheritable traits, the eugenic significance of migrations and especially American immigration, American families, the relation of eugenics and eugenics, and allied topics. Is supplied with 175 illustrations and diagrams, a serviceable index and a complete bibliography. Particularly worth while for showing the status of the problem of dealing with feeble-mindedness.

YVES DELAGE AND MARIE GOLDSMITH. *The Theories of Evolution*. Translated by André Tridon. New York: B. W. Huebsch, 1912. Pp. 352. \$2.00 net.

An attempt to bring within a small compass an account and an evaluation of the leading theories of evolution. Successive chapters discuss the idea of evolution before Darwin; Darwin and the *Origin of Species*; Natural Selection with Darwin and his successors; sexual selection; the theories of heredity proposed by Spencer, Darwin, Naegeli, De Vries, Weissmann, William Roux and his disciples, Galton and Mendel; the transmission of acquired characteristics; the theories of Lamarck, Cope and Le Dantec; organic selection; isolation; orthogenesis, and mutation. In an interesting summary, the authors conclude that no one theory offers a satisfactory solution of the problem of evolution, and that the chief problem at present is to determine how the several factors co-operate. The most important problem in this connection has to do with the mechanism of character transmission. Until that has been determined, the authors assert, we are not justified in rejecting the transmission of modifications. Unfortunately the book lacks an index.

W. L. H. DUCKWORTH. *Prehistoric Man*. Cambridge University Manuals of Science and Literature. New York: G. P. Putnam's Sons, 1912. Pp. 156. 40 cents.

In this, the most recent addition to the excellent series of Cambridge Manuals, the evidence of prehistoric man is clearly and succinctly set forth. Perhaps the most interesting part of the book is the concluding chapter, which presents a sketch of human evolution in the light of recent discoveries. The past ten years have been particularly fruitful in such discoveries, and while as yet the details of man's rise from simian ancestry are far from complete, the rough outline is beginning to take fairly definite shape.

Enzyklopädisches Handbuch des Kinderschutzes und der Jugendfürsorge, edited with the co-operation of prominent experts by DRs. TH. HELLER, FR. SCHILLER and M. TAUBE. (Two vols. I; *Abhärtung-Kunsterziehung*: II; *Landerziehungsheim-Zwangsvorstellungen*.) Leipzig: Verlag von Wilhelm Engelmann, 1911. Pp. viii, 371 and 416. Mk. 34.

To be reviewed.

SHEPHERD IVORY FRANZ. *Handbook of Mental Examination Methods*. The Nervous and Mental Disease Monograph Series, No. 10. New York: The Journal of Nervous and Mental Disease Publishing Company, 1912. Pp. 165.

This manual fills a new place in the list of manuals of applied psychology. It is an attempt to describe the methods of the psychological laboratory with reference to their employment in the diagnosis of mental disease, and places at the command of the clinician the technique and the instruments of the modern psychological laboratory in a way which has never been done before. It is a handbook for the consulting psychologist in the institutions for mental defectives, and will also be a valuable aid in the teaching of psychology to medical students. The selections seem to have been made with excellent judgment, and the presentation is clear and concise.

PATRICK GEDDES AND J. ARTHUR THOMSON. *Evolution*. ("Home University Library," No. 14.) New York: Henry Holt & Co., 1911. Pp. xiv, 256. 50 cents net.

A more popular account of evolutionary theories. The chapters are helpfully organized on the topical plan. The selection and treatment of concrete illustrations will be especially interesting to students of educational method. The authors do not shrink from social and ethical interpretations.

W. H. GROVES. *The Rational Memory*. Second Edition. New York: The Cosmopolitan Press, 1912. Pp. 172. \$1.35.

From this curious book one would never surmise that psychologists had made any investigations of memory during the past twenty years. The author preaches cultivation of the memory along the lines of Loiset and Pick, but evinces no capacity for systematic presentation. The work is a *mélange* of quotations from all sorts of popular sources, and ranges from the subconscious to the value of deep breathing.

S. J. HOLMES. *The Evolution of Animal Intelligence*. New York: Henry Holt & Co., 1911. Pp. 296.

The author's aim is "to give a fairly clear conception of the activities upon which intelligence is based, to show how intelligence is related to these activities, and to sketch the general course of the evolution of intelligence in the animal kingdom." Chapters of special interest to the educational psychologist are those on Reflex Action, The Evolution of Instinct, the Non-intelligent Modifications of Behavior, The Intelligence of Mammals, and The Mental Life of Apes and Monkeys.

MAX MEYER. *The Fundamental Laws of Human Behavior. Lectures on the Foundations of any Mental or Social Science*. Boston: Richard G. Badger, 1911. Pp. 241. \$2.00 net.

In the seventeen lectures of this interesting book the author attempts to answer the question, "What are the simplest assumptions necessary and sufficient to explain hypothetically the facts of human behavior as dependent on the function of the nervous system?" A greatly simplified description of the nervous system, as found in lower animals and man, is followed by schematic representations of the neural activities underlying reflexes and instincts, and of the modifications which these neural connections undergo in the process of learning. The establishment of motor control in eye and head co-ordinations, in the activities of locomotion, and in speech, is illustrated by numerous ingenious diagrams. The book is the most noteworthy attempt that has yet been made to trace in detail the neural changes involved in learning, and should be carefully studied by all those who are interested in an account of the physical basis of education.

C. AINSWORTH MITCHELL. *Science and the Criminal*. Boston: Little, Brown & Co., 1911. Pp. xiv, 237.

This volume is uniform with Hollander's Hypnotism and Suggestion, already noticed in these columns, and akin to it in style. It is a popular account, compiled from varied sources, of various "ways

in which scientific discovery has been utilized in the struggle between society and the criminal." Deals with systems of identification, handwriting, sympathetic inks, police dogs, poisoning trials, identification of blood and hair and the like. The author has apparently worked at second or third hand: he uses a newspaper account of an experiment by McKeever, for instance, instead of referring to the work of Stern, Binet and other authorities when discussing methods of testing the reliability of witnesses.

MARIA MONTESSORI. *The Montessori Method of Scientific Pedagogy as Applied to Child Education in "The Children's Houses."*

Translated from the Italian by Anne E. George, with an introduction by Professor Henry W. Holmes. New York: Frederick A. Stokes Company, 1912. Pp. xlii, 377. \$1.75 net.

Teachers and others who have recently heard much of the Montessori method will welcome this authoritative and detailed presentation of the author's views. In the present translation the author has embraced the opportunity to revise the Italian edition in some respects and to add two new chapters. The book is plentifully illustrated and, while lacking an index, is provided with a detailed and analytical table of contents.

PAUL R. RADOSAVLJEVICH. *Professor Boas' New Theory of the Form of the Head—a Critical Contribution to School Anthropometry.*

Reprinted from the American Anthropologist (N. S.) 13: July-September, 1911. No. 3. Pp. 394-436.

To be reviewed.

C. ARCHDALL REID. *The Laws of Heredity.* New York: The Macmillan Company, 1910. Pp. xi, 548. \$5.50 net.

By the author of *The Principles of Heredity*, but covering a wider scope. The use of facts familiar to every one and the clear style of presentation make this a valuable book for the general reader who wishes to obtain an authoritative statement of heredity.

DAVID EDGAR RICE. *Visual Acuity with Lights of Different Colors and Intensities.* Archives of Psychology, No. 20, February, 1912. Pp. 58.

Unit acuity is attained with an intensity of 40 to 50 meter-candles. A gradual reduction to 10 meter-candles causes a slow decline to 75 per cent. of unit acuity. Further reduction in intensity is accompanied by a rapid fall in acuity. Red light is decidedly more efficient than blue or green.

RAOUL RICHTER. *Religionsphilosophie*. Leipzig: Ernst Wiegandt Verlagsbuchhandlung, 1912. Pp. 178. M. 3. Geb. M. 4.

Philosophy has a right to concern itself with religion only in so far as this term denotes an attitude of mind, which is universally valid for all thinking beings. It is this "pure" or formal religion, in contrast to the various positive religious beliefs that are held, which the author here discusses. Among the topics considered are religion and knowledge, revelation, faith, the relation of religion to art and morality, the theory of reality, the problem of God, and the religious attitude of man to God, the world, and his fellow man.

L. A. ROBINSON, PH. D. *Mental Fatigue and School Efficiency*. (Bulletin No. 2, Vol. 5, December, 1911, Winthrop Normal and Industrial College of South Carolina.) Columbia, S. C.: The R. L. Bryan Company, 1912. Pp. 56.

An experimental study of diurnal efficiency, overpressure, effects of recesses, gymnastics, singing, lunches, etc. Further notice will follow.

WILLIAM C. RUEDIGER. *Teachers' Councils*. Reprinted from Education, March, 1912.

That the public is not yet inclined to take the matter of education as seriously as it merits is indicated by the fact that little or no use is made of the expert knowledge of the teacher in the direction of school affairs. Every board of education should have some means of hearing directly from its teachers on every matter of educational policy. The establishment of teachers' councils has in some localities served this function.

C. W. SALEEBY. *Woman and Womanhood. A Search for Principles*. New York: Mitchell Kennerley, 1911. Pp. 398. \$2.50 net.

Those who have read with profit Dr. Saleeby's *Parenthood and Race Culture*, his *Health, Strength and Happiness*, and other books, will be prepared to find in this volume a stimulating and timely treatment of an important topic. It treats of the purpose of womanhood, the education of girls, the conditions of marriage and divorce and similar questions. The cardinal principle set forth is that "Woman is Nature's supreme organ of the future." This principle, the author believes, is "an infallible criterion of right and wrong in all proposals for the future of womanhood."

RAYMOND SALEILLES. *The Individualization of Punishment*. Boston: Little, Brown & Co., 1911. Pp. xlv, 322.

This volume, which is the fourth in the valuable Modern Criminal Science Series, published under the auspices of the American Institute of Criminal Law and Criminology, is translated from the sec-

ond French edition by Rachel Jastrow. It contains an introduction to the original edition by Gabriel Tarde, and an introduction to the translation by Roscoe Pound. Further comment will follow.

EDMUND C. SANFORD. *The Function of the Several Senses in the Mental Life*. Reprinted from the American Journal of Psychology, Vol. 23, January, 1912. Pp. 59-74.

An interesting survey of the sensory basis of our thinking.

J. W. SEARSON AND GEORGE E. MARTIN. *Studies in Reading. Fourth Reader*. Pp. xii, 299. *Fifth Reader*. Pp. xvi, 280. Chicago and Lincoln: University Publishing Company, 1911.

These volumes mark a distinct advance in the development of school readers. The selections are, in the main, literary wholes rather than fragments. Each selection is given an effective setting by means of a brief introduction. Notes, exercises and a list of related readings also accompany each selection.

ALFRED DWIGHT SHEFFIELD. *Grammar and Thinking*. New York: G. P. Putnam's Sons, 1912. Pp. 193. \$1.50 net.

A praiseworthy attempt to analyze sentence structure from the point of view of the thinker. The author shows familiarity with Wundt's work on the psychology of language, and with James' discussions of the psychology of meaning. "His volume is addressed to teachers and serious students in both classical and modern language study who would follow the ideas they work with into their background of psychology and logic."

GEORGE DRAYTON STRAYER. *A Brief Course in the Teaching Process*. New York: The Macmillan Company, 1912. Pp. 315. \$1.25 net.

This is a practical book, intended to "help teachers grow in skill in the art of teaching and in power to appreciate the work in which they are engaged." Typical chapters discuss the importance for the teaching process of securing and holding attention, the drill lesson, the inductive and deductive lessons, the study lesson, the recitation lesson, the art of questioning, and measuring results in education. In all the discussions free use is made of the results of studies in educational psychology and in experimental pedagogy, and these are applied to the concrete problems with which the teacher is confronted. A feature of the book is the abundance of selected lesson plans.

EDWARD L. THORNDIKE. *Education. A First Book*. New York: The Macmillan Company, 1912. Pp. ix, 292. \$1.25 net.

This admirable book, written in Professor Thorndike's terse and vigorous style, sets forth simply and clearly the fundamental ideas, aims and tendencies of current educational activity. While intended

for students beginning work in education, we believe it will also be of great value to the general public, in that it will give an orientation in the somewhat confusing mass of detail which is rapidly being accumulated by scientific investigators of educational problems. The chief topics are the aims, the material, the means, the methods, and the results of education. Such a general survey from the pen of one of the leaders in modern educational studies will help to spread an appreciation of the value of experimental work in education, and we bespeak for the book a wide range of readers.

HARLAN UPDEGRAFF. *A Study of Expenses of City School Systems*. Bulletin No. 473. Washington: Bureau of Education, 1912. Pp. 96.

HORACE EMORY WARNER. *The Psychology of the Christian Life*. New York: Fleming H. Revell Company, 1910. Pp. 401.

This attempt to apply the method of modern psychology furnishes much information about Christian life, but the psychological explanations and interpretations are superficial.

FREDERIC LYMAN WELLS. *The Relation of Practice to Individual Differences*. Reprinted from the American Journal of Psychology, Vol. 23: January, 1912. Pp. 75-88.

The ability to improve with practice is a function of original and inherited nature, rather than of experience or environment. Practicability, not practice, is the mark of superiority. In a broader sense not education, but educability distinguishes the man of power.

W. H. WINCH. *Mental Fatigue in Day School Children, as Measured by Arithmetical Reasoning*. Reprinted from British Journal of Psychology, Vol. 4: December, 1911. Pp. 315-341.

This interesting study had for its starting point the question: "What difference does it make in the rate of improvement whether a class studies arithmetical reasoning the first thing in the morning or the last thing in the afternoon?" With the same amount of study groups of equal ability showed from three to twelve per cent. more gain in the morning than in the afternoon. The difference was greatest with the younger children and decreased with age.

R. S. WOODWORTH AND FREDERIC LYMAN WELLS. *Association Tests*. Psychological Monographs, Vol. 13, No. 5, Whole No. 57. December, 1911. Pp. 85.

This monograph is part of the report of the committee of the American Psychological Association on the standardization of procedure in experimental tests, and contains a discussion of cancellation tests, addition tests, color and form naming tests, the substitution test, various tests of logical relations, the understanding of instructions, and the free association experiment.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

GRADED MENTAL TESTS.¹

PART I. ATTENTION, PERCEPTION, COMPREHENSION AND MEMORY.²

CARRIE RANSOM SQUIRE, PH.D.,
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OUTLINE.

Summary.

Introduction. The requirements of serial graded tests.

The Tests.

1. Attention.
2. Perception.
3. Comprehension.
 - A. Ability to supply titles to pictures.
 - B. Ability to question.
4. Memory.
 - A. Of pictures.
 - B. Of sentences.
5. Association.
 - A. Efficiency of old associations (Opposites).
 - B. Learning new associations.
 1. Maltese Cross test.
 2. Colored forms test.
6. Invention and Construction.
 - A. Mechanical.
 1. Rectangle test (three forms).
 2. Terman test.
 3. Binet folded-paper test.
 4. Binet clock-face test.

¹I wish to acknowledge my indebtedness to Professors Angell, Dearborn and Judd for many valuable suggestions and for the privilege of giving these tests, and to Professor Whipple for assistance in preparing the results for publication. I am also indebted to the supervisors and teachers of the School of Education, who so kindly co-operated in arranging for the conduct of the tests.

²[This paper will be continued in the October and concluded in the November issue.—EDITORS.]

B. Linguistic invention.

1. Binet sentence-building test.
2. Whipple word-building test.
3. Ebbinghaus completion method.

7. Judgment.

- A. Alternatives.
- B. Selective judgment.
- C. Problem-questions.
- D. Definition test.

Conclusions.

1. Value for diagnosis.
2. Value as mental norms.
3. Limitations.
4. Comparative value of tests.

Summary of Results to Show Age-Norms (6th to 13th year).

SUMMARY.

Certain defects in the Binet-Simon tests are pointed out and the attempt is made to develop a more satisfactory series of diagnostic tests. To determine age-norms of mental development the series of tests indicated in the above outline are applied to eight groups of ten children each, pupils aged six to thirteen years in the School of Education, University of Chicago, so selected that chronological, physiological, pedagogical and psychological ages shall correspond so far as possible. In the last six groups, however, one or more pupils are found who are pedagogically retarded by one or two years. The results are tabulated separately for the retarded and the unretarded pupils. A decided parallelism is discovered between the experimental results and the mental development and school performance of the pupils. The final summary shows the norms of performance for unretarded pupils for each test at each age from six to thirteen.

INTRODUCTION.

How is the pupil to be classified? This is the problem which presents itself in varied and vexatious forms to the elementary school teacher. The mental measuring rod universally applied has been the amount assimilated of the knowledge specified in the school curriculum. There are accordingly as many measuring rods as there are courses of study. Whether conscious or not of the fallibility of this unit of measure or of the injustice of its universal application, the teacher has still been obliged to apply it, modified—if she is wise—by her own common sense and intuitive judgment of the child's ability, since no other standard was at hand. The effects of this

confusion of standards are patent. Miss Schmidt, from her study of retardation,³ concludes that what we have been calling retardation is not retardation, properly speaking, but the result of a course of study unsuited to the powers of the children who pursue it. "To say that more than half of our children are backward is certainly to make an anomalous statement." The application of these same faulty and diverse courses of study as tests of the child's mental capacity has greatly aggravated the evil.

The desirability of an accepted mental scale for the grades has long been granted. Kirkpatrick⁴ in 1900 called attention to the great need of mental tests adapted to the grades. Naturally, mental tests were first elaborated for the adult who had reached a state of comparative mental equilibrium. The difficulty of the problem is greatly increased when one attempts to adapt the tests so that they shall accurately measure the mental capacity of the child at each stage of his development.

Is the presumption that age-norms of mental capacity can be established with a fair degree of precision well founded? Wallin's answer to the question⁵ is fair and also conservative. He says: "Just as native capacity differs with individuals, so will the capacity to acquire differ with individuals; but there is probably a certain rate of acquisition which is fairly normal in a given order of civilization, so that it is possible to establish norms which hold for the great mass of average or typical individuals."

The Binet-Simon tests of 1905, followed by the 1908 series and the more meager De Sanctis tests, were the first attempts to establish mental age-norms for the entire elementary school period. As a matter of fact, these tests were devised in the interest of the subnormal child, although based upon the capacity of a hypothetical normal child at each year of growth. We are indebted to Goddard and to other students of the subnormal child for the wide dissemination of the Binet-Simon

³CLARA SCHMITT. *Retardation Statistics of Three Chicago Schools*. Elem. Sch. Teacher, 10: 1910, 492.

⁴E. A. KIRKPATRICK. *Individual Tests of School Children*. Psych. Rev., 7: 1900, 274.

⁵J. E. W. WALLIN. *Human Efficiency*. Ped. Sem. 18, 1911, 80.

tests in this country. These tests, like those in use in the Chicago Department of Child-Study, start from the correct assumption that "age-norms of native and acquired mental capacity" can have universal validity only when we eliminate all knowledge dependent upon the arts of the school.

The Binet-Simon tests have received their full share of criticism,⁶ as could be expected in the case of pioneer work. Some of the defects that have been pointed out are: (1) Certain tests are too easy and others too difficult for the grades to which they are assigned, so that the tests for some higher ages may even be easier than those for a lower. (2) The tests are not entirely independent of school training. (3) The number of tests for different ages vary. This would create difficulty if one used the corrective formula recommended by Binet and Simon. (4) The tests are not standardized. Their advocates seem to believe that flexibility and adaptability can be obtained only when the precision required in the regular laboratory experiment is disregarded. But this belief does not seem well founded, for it has been found possible, in the tests that we report herewith, to retain the precision of method required in the laboratory and at the same time to gain the flexibility necessary to a graded series. (5) The tests for the different ages are not comparable; at one age certain specific mental capacities and at another stage entirely different capacities are tested. If we agree with Galton that the capacity of man can best be measured by "sinking shafts, as it were, at a few critical points," these critical points should first be chosen and the shafts sunk at corresponding points for the different stages of development. The failure to do this seems to be the most salient weakness of the Binet-Simon tests.

What are the "critical points" at which we must sink our shafts if we are to estimate mental efficiency correctly? This is the first question to be answered if we would establish a series of age-norms. Most will agree that some of the most significant factors in the determination of mental efficiency are degree of attention, keenness of perception, ability to discriminate and assimilate—in other words, ability to compre-

⁶See particularly J. C. BELL. *Recent Literature on the Binet Tests*, this JOURNAL, 3: Feb., 1912, 101.

hend a situation—memory span, strength of associative connections (conditioning the rapidity and accuracy with which old associates may be recalled, as well as that ability to form new associates, which is commonly termed ability to learn), constructive or inventive power and, finally, judgment. These differentials of mental efficiency are very generally applied, both in the sphere of practical affairs and in the more limited field of the schools. Should it not be possible for schoolmen to agree upon a series of significant factors like these and to work out a series of age-norms that would furnish a far more accurate evidence of the child's stage of development than is obtainable from an examination of his knowledge of arithmetic, geography, etc.?

The tests described in this paper are offered as a tentative answer to this question. Having determined upon seven "critical points," it was next necessary to find adequate tests that might be applied at these particular points. The tests were chosen from a wide range; those that had been previously tried out in the laboratory were preferred if they were adapted to the requirements of a graded series. The Binet-Simon tests were suggestive; six of them were used in a more or less modified form.

While the criteria which determined the choice of tests were few in number, they debarred us from the use of many of the more familiar tests. These criteria were as follows: (1) Each test must be applicable to all stages of development. To obtain a series of mental norms—a truly genetic series—it is obviously necessary to use the same, or at least similar, tests for all the years covered by the elementary school period. Such a series of reactions should be comparable from age to age. This requirement alone ruled out many tests, since few of them are so arranged that they can be given equally well to children of six and seven years and to those of twelve and thirteen years. Most of the tests used in our laboratories are too difficult to be used with young children. (2) Each test must present a problem which the child can grasp, if not in its entirety, at least sufficiently to awaken his interest and arouse effort. (3) Each test must have content, or, lacking that, must make a sensory appeal to the subject. Much of the material

of the ordinary laboratory test is unsuited, both in form and matter, for use with immature children. Since, for the sake of analysis, the laboratory test has been reduced to its lowest terms and thereby largely divested of content, it can appeal only to the subject experienced with the psychological experiment. (4) Each test must be so arranged that it can be completed without causing undue fatigue. This criterion ruled out other laboratory tests which would have been too fatiguing to be employed with young children. (5) There should be a minimum of apparatus. The less machinery and unfamiliar apparatus, the easier it is to induce an 'at home' feeling at the beginning of the test. This is also a desideratum if the tests are to be utilized by teachers who do not have access to a psychological laboratory. No apparatus except a stop-watch was required with this series of tests. (6) The conditions of the experiment required that the complete series of tests should not consume more than two, or at most three, school periods, and no school period was longer than thirty minutes. This requirement necessitated the shortening and simplification of many of the tests chosen. All of the tests of attention, keenness of perception, ability to size up a situation, memory span, association, constructive ability and judgment were selected or modified so that they would conform to these six requirements.

It is obvious that to obtain graded norms the children tested should be representative of their age. So far as possible the chronological, physiological, pedagogical and psychological ages differentiated by Wallin⁷ should correspond. I was particularly fortunate in my opportunities in this regard. The subjects were children from the School of Education at the University of Chicago. These children are given a very careful physical examination at the beginning of each year. Thus there exists at the service of the experimenter a complete physical record for each child during the years he has been in attendance at the school. Then, too, the promotion and grading is more carefully supervised than in the ordinary school. It seems fair to presume that when physical, pedagogical and

⁷J. E. W. WALLIN. *Clinical Psychology and the Psycho-Clinicist*, this JOURNAL, 2: 1911, 198.

chronological ages correspond the psychological age may also be in agreement. The school life of these children is as healthful and normal as it is possible for school life to be.

Ten children were selected for each year. In order to restrict the distribution of ages within each year, I selected only those who had had a birthday within six months. Thus, the ages of all children in the six-year group fell somewhere between six years and six years six months.

The majority of the six-year-old children came from the lower first grade, the seven-year old from the second, the eight-year old from the third, the nine-year old from the fourth, the ten-year old from the fifth, the eleven-year old from the fifth and the sixth, the twelve-year old from the upper sixth and the seventh and the thirteen-year old from the upper seventh and eighth grades. Each group of ten above the second year contains a few who are slightly retarded or who have some physical defect which has hampered them in their school work as well as in the tests. The number of retarded pupils in the several age-groups is as follows: 8th year, 2; 9th year, 2; 10th year, 1; 11th year, 5; 12th year, 4; 13th year, 3. The results from these retarded children were tabulated separately. None of those marked retarded was more than two years, and most of them were not more than one year behind their grades.

The careful correlation of physical, pedagogical and chronological ages and the separation of the records for those who do not show this correspondence ought to ensure a standard achievement for the unretarded class. These records, then, may be safely taken as *norms* for the respective ages.

The tests were all given individually. While this consumes more time than group testing, it is the only method which gives every individual an equal opportunity. Individual testing is essential to reliability of results in working with children. The experimenter and the child come into close *rapproch*; questions can be adapted to the comprehension of the individual child, and the exercise can partake of the nature of a pleasant game rather than of a test, as is requisite to a good working mood in a child. All this is manifestly impossible when the tests are given to a group. While standard conditions were maintained throughout the series, it was also deemed essential that the

tests be adapted to each age and individual in order to secure the most effective reaction; *e. g.*, with the six-year old group the responses to most of the tests were oral, and records were made by the examiner, but in those cases where the time-factor was not used as a determinant, the responses of the older children were written by the children themselves.

THE TESTS.

1. *Attention*: The test for degree of attention which seemed best adapted to our purpose was the modification of the "a-test" used by the Chicago Department of Child-Study.⁵ At the top of the page are printed 100 a's, distributed evenly in rows. Below there are 100 a's, distributed among one hundred nonsense syllables. This modification of the test enables the experimenter roughly to abstract the motor time—the time required to mark out the 100 a's—from the finding or perception time—the extra time required to mark out the a's when distributed among the one hundred words. We added a third set of a's identically the same as the second, but introduced the element of distraction by reading to the pupil during the time he was marking out the a's. He was expected to give the substance of the matter read after the completion of his test.

This test gives two measures of degree of attention: (1) Accuracy with which all a's in sets two and three are marked out; (2) the greater length of time required for the third series in which the element of distraction was added.

As the table shows, the second measure was somewhat ambiguous, for in several cases, on account of the counter-effect of practice, the time required for the third series was even shorter than for the second. Had we used a different distribution of a's for the third set, the effect of practice would not have counteracted the effect of distraction. The first measure, that of accuracy, proved more reliable. The errors made were all omissions.

The irregularity of results for the retarded groups is in marked contrast with the regularity found in records of the unretarded; but in determining norms of accomplishment we

⁵D. P. MACMILLAN AND F. G. BRUNER. *A Special Report of the Department of Child Study and Pedagogic Investigation*. Chicago, 1906. pp. 49-57.

are concerned only with the results from the unretarded cases. These cases present a clear record of development in degree of attention with growth in years, whether we consider the average number of errors made or the maximum of error. This

TABLE I.
Degree of Attention Measured by Number of Omissions.
Unretarded.

Group Age.	Series II.				Av. No. Errors.	Series III.			
	Av. No. Errors.	Max.	Min.	M. V.		Max.	Min.	M. V.	
6	5.5	10	1	2.2	3.4	10	0	2.5	
7	4.5	11	0	3.3	3.5	8	1	2.2	
8	2.1	4	0	1.1	1.5	4	0	1.0	
9	2.2	5	0	1.2	3.0	8	0	1.6	
10	2.0	5	0	1.7	2.5	8	0	2.3	
11	2.3	4	0	1.5	3.6	9	1	3.5	
12	0.25	1	0	0.27	0.5	2	0	0.75	
13	0.6	2	0	0.7	0.5	2	0	0.6	

Retarded.

Group Age.	Series II.			Av. No. Errors.	Series III.		
	Av. No. Errors.	Max.			Max.		
8	3.0	6		2.5	3		2 cases
9	12.6	15		16.5	17		2 cases
10	3.0	3		6.0	6		1 case
11	9.6	14		6.9	41*		5 cases
12	3.7	6		1.7	3		4 cases
13	6.0	10		6.3	12		3 cases

Degree of Attention Measured by Lengthened Time with Distraction.

Group Age.	Unretarded	Retarded
	Av. in seconds.	Av. in seconds.
6	22.9	....
7	25.9	....
8	6.5	21.
9	-6.2	5.
10	13.6	-16.
11	14.0	11.
12	2.0	18.
13	-16.0	-5.

*The large number of errors made in the third series with distraction by the retarded child of the eleventh group is not surprising to one familiar with the child, who was characterized by all who know him as a "day dreamer and very flighty."

table shows two decided breaks in the rate of progress which correspond very closely to our customary division of the elementary school period. These breaks occur between the seventh and eighth years, and again between the eleventh and twelfth; they mark the transition between the fluctuating atten-

tion of the primary grades, or sixth and seventh years, and the more sustained attention of the four years belonging to the intermediate period and again between this period and that of the grammar grades, or twelfth and thirteenth years, where the attention is under excellent control.

2. *Perception*: The a-test as used by the Chicago Department of Child-Study and Pedagogic Investigation⁹ affords one of the best measures for determining the correspondence between the rate of perception and age. Perception-time was found by subtracting the motor-time from the total time taken to mark out a's in the second series. In order to allow for error arising from undue shortening of perception-time in the case of many omissions, I have followed the practice of the Department of Child-Study, and in reckoning the length of perception-time have added to the actual time taken the amount of time it would have taken to mark out the a's which were omitted; *i. e.*, perception is made comparable with motor-time on the basis of a perfect record.

The time-factor is not as satisfactory a unit in the determination of efficiency as is quality of the work done. Some of the strongest students tested had a slow reaction time, and others, who ranked low in the construction and judgment tests, surpassed them in rapidity of reaction. There is, however, a fair degree of correspondence between perception-time and age. The gain made in the eighth over the seventh and in the twelfth over the eleventh year is again noticeable.

TABLE II.
Perception-time in Seconds.

Group Age.	Unretarded.				Retarded.			
	Average Motor Time.	M. V.	Average Motor Perception.	M. V.	Average Motor Time.	M. V.	Average Motor Perception.	M. V.
6	219.5	33.9	393.6	75	174.1	...	...	...
7	144.1	28.7	226.4	43.9	82.3	...	...	...
8	99.	9.2	155.5	28.4	106.5	3.5	176.5	3.5
9	107.5	16.1	159.3	16.6	120.	26.6	193.3	42.9
10	81.	9.8	140.	23.	59	...	180.	...
11	82.6	6.2	150.	20.	67.4	9.1	141.2	12.5
12	81.	10.6	118.2	13.7	37.2	13.	120.5	10.7
13	76.	6.5	126.5	8.5	50.5	16.9	136.	31.3
								52.7

⁹MACMILLAN AND BRUNER. Op. cit.

The results (Table II) show a longer perception-time than that taken by the normal cases reported by the Department of Child-Study. This is perhaps due to a difference of emphasis; they may have laid stress upon speed, while we made the marking of a's the dominant requirement.

3. *Comprehension* (ability to comprehend a situation): The possibilities of studying mental growth are greatly enlarged if we use material rich in content and meaning in place of the discrete and—from the child's standpoint—uninteresting matter presented in the a-test. The material selected must not be too complicated to be comprehended by a six-year-old child, and must be deemed worthy of study by the oldest group. I chose for this test five pictures, all reproductions of paintings by artists of note. The first three were colored, and the last two were in black and white. The pictures in the order in which they were given were: *In Disgrace*, by Sigsbeekar—a pouting child sits with face to a corner, while a dog, the picture of dejection, crouches beside her; *In Summer*, by Van der Veer—six Dutch maidens sit in a circle on the grass, knitting; the landscape is typically Dutch; *Children of the Press*, by Thompson—poorly-clad children are shown in a crowded city street on a winter's day in the act of receiving their papers for the day's distribution; *The Goose Girl*, by Millet—too well known to need description; and lastly, *Embers*, by Eastman Johnson—an old man seated before a grate in which the fire is slowly dying.

The test was given in two forms: The first form required appropriate titles for each picture; the second, the formulation of pertinent questions. The first form gives an opportunity to study the development of interpretation and assimilation, the ability to unify discrete perceptions and to find meaning; the second tests the same capacity by an obverse method.

A. *Ability to supply titles*. It goes without saying that we did not ask the younger groups for the titles of the pictures. We asked them what they would like to call the picture. There was no time limit in this test. The children were given one picture at a time, in the order mentioned, and were allowed to study it until they found a name which suited them. The titles given varied from the mere enumeration of the objects

in the picture to appropriate phrases that displayed a complete apprehension of the artist's meaning. We have subsumed these titles under five rubrics: enumeration of objects, description of picture, unification in terms of action of principal figures, superficial unification in terms of relation to principal object and complete comprehension evidencing imaginative insight. "The lonely man," one of the titles given to *Embers*, illustrates what we mean by superficial unification; there is a partial comprehension of meaning, but a failure to see the significance of the dying fire pictured in conjunction with the old man. A very few in the twelfth and thirteenth group did comprehend the complete meaning, as titles like "The End" would indicate. "The Punishment," a title given several times for the first picture, shows complete comprehension of its meaning. The significance of this picture was grasped earlier and more frequently than that of any other.

With only ten children in each group and five rubrics it seemed unwise to distribute the results further by separate tabulations for unretarded and retarded. Had it seemed advisable to do this, the results would not have presented as many irregularities as appear in Table III.

TABLE III.

Comprehension as Measured by Ability to Supply Titles.

Group Age.	Enumeration of Objects, Per Cent.	Description, Per Cent.	Action, Per Cent.	In Relation to Principal Object, Per Cent.	Complete Comprehension, Per Cent.
6	62	28	10	..	..
7	20	70	10	..	..
8*	16	28	40	12	..
9	8	42	28	20	2**
10	..	24	46	26	4**
11	6	10	38	36	10**
12	4	12	14	52	18
13	..	6	30	30	34

*Four per cent. of this group failed to give a title.

**These first instances of complete comprehension were interpretations of the meaning of the first picture. The artist has succeeded in expressing himself so clearly and forcefully upon a well known theme that even the younger groups succeeded in grasping the whole situation.

From these results it seems fair to say that: (1) No six-year-old child can be expected completely to comprehend a situation presented pictorially. (2) Neither can a seven-year-old child be expected to give an adequate title—a child of this age seems most interested in the appearance of the objects presented. (3) The eight-year-old children are inclined to interpret meaning in terms of action, and a few are able to give superficial titles. (4) In the ninth and tenth years, while descriptive phases and activities of the objects are most likely to be considered, there is, in case of the first picture, complete comprehension of the artist's meaning. The descriptive titles, when given, are condensed into terse phrases, and no longer stretched out into disjointed sentences. (5) In the eleventh year the answers show a wide distribution, due mainly to the fact that the proportion of retarded pupils was greater in this year than any other (the table has not differentiated the retarded from the unretarded). This fact accounts for a small percentage of cases in both the eleventh and twelfth year that indicate only initial stages in comprehension of meaning. (6) In the twelfth year the majority of names given to the pictures would pass for titles, although a large proportion of them deal with superficial aspects. (7) There were many cases of complete comprehension in the thirteenth year. This imaginative insight could not be expected before adolescence.

B. Ability to question. To formulate in a pertinent question the main thought of a picture is more difficult than to find an appropriate title for it. There were numerous failures to frame any kind of a question. The questions asked have been classified as irrelevant when extraneous and irrelevant associations were called up, as minor when unimportant aspects of the picture were dwelt upon, and as essential when the main thought of the picture was indicated. The questions on essential features asked in the cases of the seventh and eighth-year groups were all with reference to *In Disgrace*.

Comprehension as Measured by Ability to Formulate Questions.

TABLE IV.

Group	Failure.	Irrelevant.	Minor.	Essential.
Age.	%	%	%	%
6	50	40	10	0
7	30	32	32	6
8	12	13	68	7
9	..	48	40	12
10	..	20	56	24
11	..	16	60	24
12	..	22	48	30
13	..	8	54	58

We note that in the sixth year there are many failures to frame questions, and that at best questions are likely to be irrelevant. In the seventh, and still more in the eighth year, the child's questions are relevant, but deal with minor aspects of the picture. There appears to be a fairly steady growth in the ability to frame essential questions through the remaining years.

I have selected a few questions from those asked regarding *Children of the Press* and *Embers* as illustrative of the growth with age in ability to comprehend meaning and formulate fitting questions. "What is that writing?" (The name of the artist) was asked by a six-year child. "Are the children going to school?" was asked by a seven-year old. Neither child had the slightest comprehension of the meaning of the picture before him and both questions were classed as 'irrelevant.' "What papers are they selling?" and "Is there a fire in the fireplace?" were asked by children in the eighth year. These questions are also typical of those which were classed as 'minor,' since they indicate only a superficial grasp of the artist's meaning. "Why do the children sell papers? Is it to make money for their parents?" and again "Is the old man thinking of his family who are gone and is he about ready to die?" were asked by a child of twelve and one of thirteen years. Questions which showed the fairly complete comprehension of meaning illustrated in these two examples were always classed as 'essential.'

4. *Memory*: Does memory develop during the elementary school period *pari passu* with mind? Investigators are not in complete accord. Allowances must be made for differences in method and material used, which would undoubtedly account for the many differences in result. The test with digits employed by Smedley has the advantage that it may be given in many ways, but it presents a serious disadvantage for six-year-old children, and even for an occasional normal seven-year-old child who may not have been to school. Familiarity with digits is gained very largely in the schoolroom. Several of the six-year-old children had difficulty with the six digits

we employed in our learning test. Neither would the digits seem worth remembering to children unless they could look upon the test as a game. A maximum of effort is gained only by interest, and we cannot measure the child's actual ability unless we can obtain sustained effort on his part. The material used by Binet in his tests seems best adapted to secure correct measures of development of memory.

I used two forms of material—pictures and sentences.

A. Pictures: The Binet method was varied in the following manner: Only one card was used, instead of a series of cards. This card measured 8 by 5½ inches. Upon it were arranged twenty pictures of unrelated objects, namely, a girl's head, a hen, a barking dog, a spool of thread, a feather, an automobile, a hammer, a Morris chair, a boy on a sled, a cow, a house, a hand, a pony cart, two camels, a bottle, a slipper, a shoe, a pan, a basket of puppies and a thimble. If I had presented only ten, or even fifteen, objects on the card, I should not have exceeded the memory span of some of my subjects.

The card was exposed for thirty seconds, then withdrawn, while the children were asked to give the names of as many of the objects as they could recall. The exposure gave them ample time to glance over the entire card. The interest felt in the experiment was evinced by the frequent request to see the card again, in order to find out what had been forgotten. There was greater effort on the part of the children than could possibly have been obtained had we used digits, letters or non-sense-syllables.

TABLE V.

Memory Span as Measured by the Picture-Test.

Group Age.	<i>Unretarded.</i>				<i>Retarded.</i>		
	Average No. Correct.	Max.	Min.	M. V.	Average Correct.	Max.	Min.
6	5.3	7	3	1.2	....	....	..
7	6.5	12	5	1.3	....	....	..
8	9.5	13	6	1.6	5.0	8	2
9	9.8	15	6	2.5	8.2	11	5
10	9.1	12	6	1.9	6.0	....	..
11	11.4	15	8	1.9	6.0	7	5
12	10.5	13	8	1.7	10.6	14	9
13	10.0	12	8	1.2	10.0	11	9

Here, as in the previous tests, the results reveal at a glance three well-marked stages. Children of six and seven do not seem able to retain much more than six objects, though occasionally a child will recall more. The average number retained by children of eight, nine and ten years seems to fall between nine and ten objects, though the exceptional child may recall as many as fifteen. As a matter of fact, the table does not show the gain of the ten-year over the nine-year group—four of the latter group came within one of the maximal record. The lower average for the tenth year is to be accounted for by the lack of any exceptionally good record like that made by one of the nine-year group. In the memory test the eleven-year group grades with the twelfth and thirteenth, instead of with the younger groups, as in the previous tests.

B. Sentences: Auditory memory was tested by the Binet method as modified by Whipple¹⁰. These sentences are arranged in a progressive series, beginning with two and ending with forty-two syllables. They have the same advantage that the pictures possessed over the material ordinarily employed in laboratories. We began with the second sentence for the six-year group; but with the older groups it was found to be economical of time to begin with the fourth or fifth sentence, since these were well beyond the range of possible error. Each sentence was given but once, slowly and distinctly, and the child was asked to reproduce it. During this test the child was always directed to sit with his back turned toward the experimenter.

The exclusion of the retarded group has brought out a very close correlation between mental growth and immediate memory. The substitution of a word, even though it did not distort the meaning of the sentence, a single insertion or omission, was counted an error. The figures, therefore, represent the number of sentences correctly reproduced. The number of syllables correctly reproduced can be roughly estimated by multiplying the number of sentences by two, though this rule will not hold entirely, especially for the longer records.

¹⁰G. M. WHIPPLE. *Manual of Mental and Physical Tests*, Baltimore, 1910. p. 494.

TABLE VI.

Memory Span as Measured by Sentences.

Group Age.	<i>Unretarded.</i>				<i>Retarded.</i>		
	Av. No. Without Error.	Max.	Min.	M. V.	Av. No. Without Error.	Max.	Min.
6	7.8	10	6	0.8	....	....	..
7	8.4	10	6	1.0	....	....	..
8	9.8	11	8	1.0	8.0	8	8
9	10.1	13	8	1.4	9.0	9	9
10	10.9	14	9	1.2	6.0	6	6
11	10.9	13	10	1.2	9.5	12	8
12	13.5	16	11	1.5	10.5	12	9
13	14.5	16	12	1.5	10.6	13	8

Exceptions are due mainly to unevenness in two points of the series. The twelfth and seventeenth sentences are not as difficult as those immediately preceeding them, even though these sentences contain two more syllables than the eleventh and sixteenth. The twelfth and seventeenth sentences could easily be modified so that the series would be one of progressive difficulty. The twelfth sentence was found less difficult than the eleventh because of its simpler form, possessing fewer modifying words. The simplicity and familiarity of the idea presented by the seventeenth makes it range in difficulty with the eleventh and twelfth. Table VII shows the relative ease of the sentences.

TABLE VII.

*Relative Ease of Sentences Used for Testing Memory.**Percentage correctly reproduced.*

Sentence Age.	7th. Per Cent.	8th. Per Cent.	9th. Per Cent.	10th Per Cent.	11th. Per Cent.	12th. Per Cent.	13th. Per Cent.	14th. Per Cent.	15th. Per Cent.	16th. Per Cent.	17th. Per Cent.
6	60	50	40	0	0	30	0	0	..	..	..
7	90	70	30	20	0	30	0	10	..	..	..
8	90	100	50	40	0	40	10	10	..	..	..
9	90	90	90	50	20	60	0	10	..	..	..
10	100	100	80	70	20	30	40	20	..	..	..
11	100	70	50	40	10	70	40	20	..	..	..
12	100	90	70	100	30	70	50	50	10	10	50
13	100	100	90	80	10	70	70	50	30	30	70

There were so many complete failures on the fifteenth and sixteenth sentences that I did not try the seventeenth until the

twelfth year. But the results indicate that the seventeenth sentence is certainly no more difficult than the thirteenth or fourteenth. As previously stated, the errors were mainly cases of substitution, insertion and omission that did not destroy the meaning of the sentence. After the sixth year the ideas were correctly reproduced until the fifteenth and sixteenth sentences were reached.

(Continued in the October number.)

A STUDY IN THE PSYCHOLOGY OF SPELLING.

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SUMMARY.

The ability to spell is based on an acquired sensori-motor arc. The rate at which the arc is formed bears a significant relation to the relative uses made of the dominant and subdominant imaginal types during the conscious stages of the process. The sensory section of the arc forms more slowly and is more readily disturbed by changed conditions than that of the motor. An individual may have several spelling arcs each commanding its own type of imagery and serving its own group of words.

INTRODUCTION.

In so far as spelling depends upon habit-forming processes, it is an act of skill and, as such, involves a sensori-motor mechanism. Three facts, however, complicate what would otherwise be a simple response: the first is the tendency toward special imaginal types, the second is the two possible modes of expression, oral and graphic, and the third is the non-phonetic character of our language. The relations existing between the first two groups of facts give rise to the following spelling arcs:—the visual-graph-motor, visual-speech-motor, auditory-graph-motor, auditory-speech-motor, and also combinations of these simple arcs. The present investigation was undertaken (1) to seek further verification of the relations between the imaginal types, modes of presentation and of expression as related to the spelling process; (2) to see if any significant connections exist between the imaginal types, possible aids, kinds of errors and hindrances, and (3) to study the nature of the existence of imaginal types, indirectly, of course, and their mutual relations.

GENERAL PLAN OF WORK.

The general plan of the work is indicated in detail in Table I. The fourteen subjects were high-school graduates in their third term at a state normal school. Eight worked under favorable and six under unfavorable conditions, as related to their inferred imaginal types, while two of the imaginal "favored" and three of the imaginal "unfavored" worked under conditions that interfered with the *motor* phase of their spelling arcs. C. C., E. S., E. P. and G. R. preferred the graph-motor form of expression, but under the conditions used only speech-motor, while K. K. was speech-motor, but had to use graph-motor. The imaginal types and spelling-arcs were determined a month before the spelling investigation began. Some seven weeks were devoted to this preliminary work. The methods used are detailed at some length on account of the vital relation existing between the nature of the imaginal types and the results of the spelling tests.

PRELIMINARY TESTS OF IMAGINAL TYPES.

These determinations were made by four methods: The subject (*a*) wrote as rapidly as possible for five minutes (five minutes were allowed but not always used) (1) the names of objects characterized by color, (2) the names of objects characterized by sound; (*b*) memorized a 25-member letter-square and reproduced it line by line, diagonally, as a cross, spirally, and by any horizontal or vertical line as called for; (*c*) memorized letter-squares, letter-series, and nonsense figures (4, pp. 396-399) (1) without directions, (2) with directions; and (*d*) described the usual and preferred methods of learning and reproducing the several school subjects.

The lists of words in "*a*" were each distributed into the following classes: pure visual, pure auditory, visual auditory, mixed, perceptions (words suggested by objects in the room or by accidental disturbances), and associations (words of doubtful imagery whose presence was apparently due to a strong bond of association).

C. R.'s visual and auditory lists, respectively, are given as examples. *Visual*: Sunset, sky, lake, trees, river, wine, grapes, oranges, apples, chocolate, eyes, hair, dress, canary, robin, rose, lily, daffodil, carnation, violet, trill-

lium, evergreen, class-colors, grass, pumpkins, carrots, smoke, lightning, blaze, snow, scarlet, fever, diphtheria. Total 33.

Auditory: Thunder, buzzing, bell, fog-horn, waves, mouth-organ, wind, storm, trolley-car, program-clock, dinner-hour-at-hall, yelling, class-day, laughing, crying, mewing, cackling, scolding, saw-mill, train-wheel, screeching, creaking, whistle, drum, flute, picnic, small boy, slate pencil, squeaking, chirping. Total 30.

Concerning this latter list, the subject says: "I tried to think of as many different kinds of sounds as possible and *then give names to them*. In some instances the visual image came before the auditory. I saw several people seated on the ground at a picnic before I heard them. I saw the saw-mill before I heard it. Some of the words suggested noises and pictures just as the remembrance of a song may recall a singer and yet not be associated with her."

A critical analysis of the list gave the following results:—

<i>Visual List.</i>		<i>Auditory List.</i>	
<i>Class.</i>	<i>Percentage.</i>	<i>Class.</i>	<i>Percentage.</i>
Visual	76	Auditory	40
Visual-Auditory	0	Auditory-Visual	26
Mixed	0	Mixed	20
Perception	0	Perception	0
Association	24	Association	13

At the end of the five minutes the subject was asked to state whether the time seemed relatively long or short. Test "a" while being performed was considered a mere "feeler," but it tallied so well with the more rigid determinations that more than passing mention seemed justifiable.

The results from the "b" tests were, in themselves, of little value, for it usually happened that the subjects who could reproduce the letters correctly and readily in one way could do so with equal readiness in any other, which according to theory and previous investigation should be true only of visiles. But it turned out that the manner of learning correlated with the type of imagery later determined. The audiles and mixed types made use of mnemonic devices and rhythmic combinations, while the visiles relied more on repetition, place-memory and the use of the initial letters in the top and in the vertical left lines as cues.

The material for test "c" (1) *without direction* consisted of four 12-letter squares, four 9-letter or digit series and 4 nonsense figures for graphic reproduction. After the letter-square had been recorded, both the manner of learning and recall were given at once in detail.

A few cases taken at random are submitted.

Original.				<i>Letter Square.</i>				Reproduced.			
V	B	J	T					B	K	Z	
Z	R	F	Q					Z	R	J	Q
K	D	G	H					K	D	G	H

C. C. (audile) writes in her introspection: "B Z K were purely auditory and B was accented (the subject is ignorant of the nature and number of her mistakes). Z and R were auditory, Z being accented, J Q were visual until I was ready to write the letters, when they suddenly became the initials of James Quinn (auditory). K D G H were rhythmic to me, until I wrote them down when they suddenly meant Kid Gladys Hawkinson."

C. R. (mixed) writes of the same card: "I learned this square by imagining I heard the letters said and by visualizing their positions. In reproducing them, I began writing under a strain and when I came to the last line I could not see the first two letters, and as I had no time to ponder, I wrote G H, which I saw clearly and remembered some peculiarity about them."

K. K. (decidedly audile), writes concerning the same square: "I accented the end letters to the right. I failed to recall the first line, but the other two I seemed to hear whispered to me as I wrote them."

Learning and reproducing the 9-letter or digit series showed wide differences in both quality and quantity of work. Two general tendencies emerged at once and persisted throughout: (1) that of quality of work as to accuracy of order, few substitutions, taking advantage of end-letters in the series, and small quantity of reproductions; (2) that of a relatively large reproduction, poor in quality as to inversions, substitutions, and a tendency to euphonious combinations.

A. G. (visile) says: "In the first series (original, J B R F C M N P V, and reproduced as J B R F P W C M V) the first four were associated with two words, Job and reference; the second four, P W C M, were visualized in their order as the *second four* of the series and the last letter was distinctly seen as the end letter."

K. K. (original series W Q C J M X B Z K, and reproduced as W Q C X M J B Z K) says: "W Q was reproduced by position, C M X were auditory, through the peculiarities of the sound of the three letters 'saxom.' The next four were auditory and were grouped into a word sounding like 'jay-be-z-ke.'"

E. P. (mixed type) (original series K B S M C Z P F R, reproduced K G C Z F C M) says: "K G were visual because I remembered Kg to denote kilogram in physics. C Z were auditory on account of their sibilant sound. F C were visual as the initials of a name. M was auditory on account of its humming."

Learning and reproducing the nonsense figures, graphically, gave unexpected values. The *procedure* required *S* to close her eyes and hold the pencil as in writing, while *E* laid the drawing on the table and drew *S*'s hand over the lines twice. The movement was slow and continuous and the pencil was not raised from the paper until the tracing was completed. *S* was then given a sheet of paper and with closed eyes reproduced the figure as she thought it was. *S* knew that the figure had but six lines and five angles. An arbitrary value of 50 was assigned to the lines and angles respectively, and thus permitted a quantitative determination of the reproduction in

terms of the original figure. While the test aimed directly to discover the role of motor imagery, it gave, indirectly, valuable evidence on the condition of other forms of imagery. Results were not uniform in accuracy for the same individual; a very good reproduction might be followed by a poor one, but when this occurred, the subject *could tell why*. In the light of preceding and subsequent tests, it showed that if a visile failed, it was due either to a poor motor image not supplemented by a visual image or to the absence of both, but in the case an audile failed, it was for the lack of motor imagery alone.

K. K. speaks of making synchronous movements with the left hand. M. P. (an audile) says: "I noticed that my body swayed in unison with the hand movements." Visiles and audiles used verbal motor imagery in describing the figure while tracing it, *e. g.*, down, up, back, out, oblique, etc. Visiles and mixed speak of rolling the eyes and of strain in the eyelids (balls) and in the outer portions of the eye globe. The percentage of accuracy of the visiles was from 20 to 45 per cent. higher than that of the audiles.

The second part of "*c*" test, given *with direction*, adhered strictly to the conditions outlined by Titchener (4, p. 389), but in addition to the letter-squares, series and nonsense-figures, 12 series of short difficult words in groups of three each were presented, after the manner of the letter-squares and series. The results of the "*c*" tests not only contributed material evidence to the problem of imaginal types, but it aided in determining the subject's spelling arc (see Table 1).

The "*d*" tests, if they may be considered tests, prevented a too narrow interpretation of the more exact methods and gave presumptive evidence of the existence of "preferred" and mixed imagery as against isolated and "boxed up" imaginal types.

E. S. (audile) writes concerning her ways of learning and reciting the school subjects: "I find that I have to read my lessons aloud before they mean much to me. In studying Latin I never can recite unless I have heard myself say the words at least once. But no matter what I study, I always know almost the exact place in the book, the side of the page, the distance from the top or bottom at which the subject-matter is placed. I do not see the subject-matter, nor hear it, nor can I always recite on that part, but if it is mentioned, I know where it is. In studying history I read the lesson aloud

and get a picture, not of the words, but of the scene mentioned. Sometimes it is not convenient to read it aloud, and in that case I can still hear the sound of the words though I am not even whispering them. When I have to recite on a topic, I find that I am not very well prepared unless I have practiced reciting to myself. When I do recite, I find that I have the same voice inflection and accent and emphasize the same words as when reciting to myself. In learning poetry it is the same. In geography I have a vivid visual picture of every map I study: I visualize the products of a country as I study them. In taking lecture-notes it is very hard to understand what is being said, unless I can see the lecturer's face, and when I reproduce the words for myself I hear the voice, the words, and see the expression of the face attending every thought. When I hear a new word I can see the expression on the face and hear the voice of the speaker for a long time afterwards. I think that, while my type of imagery is mixed, auditory predominates." The results throughout the several tests gave uniform evidence that E. S.'s imagery, so far as it related to language and words, was auditory-motor.

These several determinations unite in showing that imagery may exist either as mixed or as preferred:—the former means, here, that visual, auditory and motor images function mutually together and are disadvantaged when forced to work separately in word learning, and the latter, that either visual-motor or auditory-motor is the preferred type. An analogous condition exists in the right-handed who in learning tennis, for example, prefer to practice with the right hand and would be handicapped if forced to use only the left.

SPELLING TESTS.

General Conditions of Work.—The subjects were divided into seven sections of two each, and the sections combined into three groups according to their imaginal types as indicated in word learning, *i. e.*, visual-motor, auditory-motor, and auditory-visual-motor. The imposed conditions of Section "c" were not so much an adverse appeal to their dominant imaginal types as they were an interference with their habitual ways of learning to spell. E. P. says: "In learning to spell audition aids me but little; I rely almost wholly on visualizing and writing." The prescribed mode of learning denied her both of these means. C. R., although strongly auditory for some things, says: "I had a desire to write the word for the picture, but before my imagined picture was formed and stable, I had to spell the word by syllables. Spelling aloud with no word before me and syllabifying took away almost everything I had gained from hearing." These considerations

seemed to justify placing Section "c" with the unfavored groups. This classification was called in question, however, by the rapid rate of learning of these two *S*'s, which in turn may be due to their high average spelling ability (87.5 per cent.).

The spelling abilities of the subjects (see Table I) agree remarkably well with their school standing and general work-

TABLE I.
Showing Plan of Work.

Subject		Imaginal Types by Sections	Spelling Arc.	Spelling Ability in Per Cents.	Mode of Learning
H. B.	Fa	V-Ma	Visual-graph- motor.	81	See word exposed 5 sec. on card and write it.
A. G.	Fa	V-Ma	Visual-graph- motor.	82	
M. Ch.	Un	V-Mb	Visual-graph- motor.	81	Hear word twice, spell orally and pronounce it.
A. S.	Un	V-Mb	Visual-graph- motor.	80.5	
C. C.	Fa	A-Ma	Auditory-graph- motor.	88	Hear word twice, spell orally and pronounce it.
E. S.	Fa	A-Ma	Auditory-graph- motor.	89	
K. K.	Un	A-Mb	Auditory-speech- motor.	80.5	See word exposed 5 sec. on card and write it. (This sec. recites with V-Ma sec.).
M. P.	Un	A-Mb	Auditory-graph- motor.	86	
M. Cu.	Fa	A-V-Ma	Visual-auditory- graph-motor.	82	Hear word twice, once alone, 2nd time given in sentence by moni- tor to write.
A. M.	Fa	A-V-Ma	Auditory-graph- motor.	83.3	
R. W.	Fa	A-V-Mb	Visual-auditory- speech-motor.	75.5	See, hear, spell, pronounce and write word.
E. W.	Fa	A-V-Mb	Visual-speech- graph-motor.	85	
E. P.	Un	A-V-Mc	Visual-graph- motor.	83.5	Hear word twice, pronounce it, spell and syllabicate it orally and re- pronounce it.
C. R.	Un	A-V-Mc	Visual-auditory- graph-motor.	91.5	

"Fa" indicates the subjects who worked under conditions that favored their imaginal types: "Un" indicates the subjects who worked under opposite conditions. It was considered that the subjects in Sections "a" of the visiles, audiles and mixed groups respectively and also Section "b" of the latter group were learning under conditions favoring their imaginal types, while those in Section "b" of the visiles and audiles and Section "c" of the mixed group were learning under conditions unfavorable to their imaginal types.

ing efficiency, with the exception of K. K. and R. W., whose school standings range from 8 to 12 per cent. higher.

The subjects wrote a brief introspection after each test-lesson, noting whether the conditions favored or embarrassed their learning, whether the report and anticipatory processes, respectively, produced doubt or certainty, and recorded incidental aids and distractions. Separate rooms and monitors "coached" in pronunciation were assigned to oral spellers; subjects learning from visual presentation worked in the same room, but with a separate monitor. The monitors kept a record of all misspelled words, and duly labeled and preserved

LIST OF FOUR HUNDRED WORDS.

First Forty. Second Forty. Third Forty. Fourth Forty. Fifth Forty.

appall	breccia	credible	develop	empyrean
acquiesce	banana	conscience	dactyl	elixir
accommodate	bandanna	consensus	deceive	encyst
accede	bambocciade	cereal	depot	empale
assent	Barbadoes	chapeau	dahlia	enascent
acceptable	bargain	chaplain	dairying	ensemble
accessory	barnacle	cervical	daisy	enseel
assize	barratry	cleat	decennial	enterocele
allegory	basal	chagrin	decisive	ephesite
asafetida	basset	cestracion	decilitre	epithem
acanthice	bdellatomy	chlorosis	demandable	equery
abscissa	beadle	clivus	delitescence	erascible
abattoir	bedaub	chalybeate	deniance	erectile
aberrant	bedding	clinometer	denticle	Eridamus
apocalyse	begonia	cloddish	dentine	errhine
aphorism	Belgian	chaprejos	dependent	erysipelas
aphis	belladonna	chanticleer	disciple	escrow
amenable	belligerent	chartaceous	dolorous	escurial
amiable	belfry	clientele	domine	esnecy
amnios	belsire	clinant	drazel	Essene
absconce	Benjamin	Clarabella	Danish	endictment
apocalypse,	Bengalese	cleansing	Damascus	enfilade
alchemy	benzene	chalaza	Daphne	essence
anaesthesia	besom	clavicle	darkening	emollient
amnesia	Bessemer	clematis	darning	empirical
assure	betel-nut	changing	dancus	encephalic
artesian	Bethlehem	clannish	Davy	ensigncy
arson	Bedouin	clevis	decedent	eocone
abscession	bedridden	changeable	decern	epulary
abstinence	bison	clemency	decidable	equable
auctioneer	bisson	ceryl	declinable	equitable
apricot	bivious	circus	delirious	erasure
aries	bizarre	cervia	demise	ericaceous
arable	blaming	citreous	demurrage	erratic
arsenal	Blenheim	chalice	depascent	erotesis
arachnoid	blenny	citrus	disind	escapable
arbuscle	bloedite	chalet	disgavel	escalop
araceous	blouse	coadjuting	domesman	escroll
appian	beryl	clysman	druid	espionage
appreciable	Boccaccio	clepsydra	dromedary	estimable

all of the subject's written work. The words were written in a large, legible, uniform hand on cards two by three inches, and to favor economy and increase accuracy were numbered from 1 to 400. Words unlearned during the first series could be learned, of course, only during the second, as the conditions proscribed the consultation of dictionaries and other sources. The subjects frequently recorded during the second series the recognition of words misspelled during the first.

Material.—The material consisted of obsolete, technical, unusual and odd forms of words, four hundred in number,

LIST OF FOUR HUNDRED WORDS (Continued).

Sixth Forty. Seventh Forty. Eighth Forty. Ninth Forty. Tenth Forty.

estrepé	Gabriel	holiday	invidious	loathful
estoppel	garnishee	homeopathy	invariable	litmus
eulogy	garreteer	homonymous	iridescent	militia
Eugenia	garrulous	hollyhock	Israelite	medallion
Eusebian	gabion	hospitable	isotherm	liturgic
eurycerous	garlic-pear	humerus	irascible	luscious
esteemable	gelatin	hydropathy	irritable	lunette
evanesce	gemellus	hysteria	irony	Lyonnaise
eversive	genius	Huguenot	itinerary	lythraceæ
evincible	geyserite	horrify	jardiniere	mackerel
exceedable	gullible	hospice	jasmine	Maccabean
excitable	gypsy	hurdle	jaundice	Madeira
evincive	grenadine	igneous	jessamine	maintenance
excrete	gyrfalcon	ignana	jeweler	Malachi
exercisable	grimace	illicit	jocoseness	malaria
exhalable	guerrilla	imminence	judicative	marsupial
exigible	gyroscope	imperious	joinery	measles
expiring	gosling	implacable	juvnescent	Mafia
explicit	gossamer	improbable	keelson	medalist
expunge	gordiacea	incessant	khédive	onomatopoeia
expuition	gristle	indefensible	kilostere	obliging
facetious	gaberline	indefinite	kennel	observable
facial	guillotiné	inducible	kilolitre	orguINETTE
facing	gargoyle	infrangible	knowable	original
fagging	Gargantua	internecine	lactiferous	osirify
falciform	gallicize	ichorous	lachrymal	osseous
fallacy	glaireous	illegible	lacing	piperitious
falsifier	gallinaceous	illative	lactescence	maxilla
fanciful	gambeson	immiscible	lieberkuhn	medusa
farrier	galvanometer	immolate	leprosy	mavis
fascicle	Ganymede	imperceptible	licorice	mediaeval
farinose	gaming	imprimis	liquefy	maelstrom
fascine	Gehenna	inaudible	lieutenancy	nullify
fatuous	germicide	inclinable	lattice	nutrient
feasible	Gethsemane	inclemency	legible	nuisance
favose	gullet	indehiscent	lemonade	remittance
febrile	herring	indelible	liaison	recision
fencible	hickory	ineffable	liege	scission
faciate	hirsute	ingratiating	linseywoolsey	seismic
ferial	hinderance	interrogate	litigious	seceder

divided into ten groups of forty words each. (See lists.) Actual words conform better to ordinary spelling conditions than nonsense syllables. (1, pp. 482-83.) A series consisted in learning the ten groups at the rate of one group per lesson, three lessons per week. A lesson consisted of two parts: (1) forty words were taught, and (2) the subject's knowledge of the forty taught in the preceding lesson was tested. By this arrangement eleven sittings were required to complete a series. The entire work required seven weeks. At the close of the second series the subjects examined each of the four hundred words and indicated whether it was a *new*, a *doubtful* or a familiar word—an essential item in determining what was actually *learned*.

Results.—Table II shows the entire number of errors made by each section in every lesson. The mistakes are grouped under three heads: (1) "error," (2) misspelling, "msp," and (3) wrong-word, "w-w." This grouping arose from the fact that the two subjects comprising a Section would not only often miss the same word, but would make more than one error in it. For example, *eurycerous* was spelled *euriserous* by one subject and *eurycirous* by the other of the same Section. As a wrong word it counted 1, as a misspelled word 2, and as to errors 4. Comment on the significance of these facts is made below. The percentages of *new* and *doubtful* words of the favored groups, A-Ma, A-V-Ma, V-Ma and A-V-Mb are, respectively, 43.10 per cent., 38.50 per cent., 41.75 per cent., 53.37 per cent., and of the unfavored, A-Mb, A-V-Mc and V-Mb, are, respectively, 46.74 per cent., 48.74 per cent. and 49.24 per cent. That is, the unfavored groups have an excess of 3.97 per cent. to their advantage.

Table III, showing percentages of correct spelling, is derived from the column of misspelled words of Table II. Graphs 1, 2 and 3 further express the facts of the same table. A comparison of the percentages of correct spelling of the Favored and Unfavored Sections of the V-M Group shows that the latter excel the former in five out of twenty lessons, and that four of these five occur in the first series. The averages of the percentages in the second series of the Favored and Unfavored sections of this Group exceed those of the first series

TABLE II.
Distribution of Spelling Mistakes by Lessons and by Sections.

Sections.	V-M ^a			V-M ^b			A-M ^a			A-M ^b			A-V-M ^a			A-V-M ^b			A-V-M ^c		
First Series:	Error.	Msp.	W. W.	Error.	Msp.	W. W.	Error.	Msp.	W. W.	Error.	Msp.	W. W.	Error.	Msp.	W. W.	Error.	Msp.	W. W.	Error.	Msp.	W. W.
I.....	11	11	6	30	25	20	4	4	4	13	13	8	12	11	9	24	20	16	18	17	15
II.....	14	12	8	27	21	20	2	2	2	8	8	6	12	11	9	24	20	16	18	17	15
III.....	29	27	15	26	15	14	10	8	7	20	18	11	15	11	8	26	23	18	29	24	17
IV.....	6	5	5	12	10	9	3	3	3	6	6	4	7	11	7	16	13	10	13	13	13
V.....	44	39	22	45	33	22	20	18	15	35	28	16	34	28	19	57	30	22	30	25	19
VI.....	43	34	19	28	19	16	8	7	6	18	18	14	34	24	18	34	24	18	27	23	15
VII.....	26	22	15	29	22	21	13	12	11	22	22	14	19	17	13	32	24	15	22	20	18
VIII.....	3	3	2	20	17	13	4	4	4	12	10	8	12	11	9	15	16	13	19	14	10
IX.....	7	6	5	20	16	15	1	1	1	17	15	10	14	14	11	15	13	10	19	18	17
X.....	26	22	14	25	21	20	4	3	3	9	7	6	10	10	8	21	18	14	14	13	11
Total.....	209	181	111	262	201	170	69	62	56	160	145	97	182	154	114	231	189	144	200	175	143

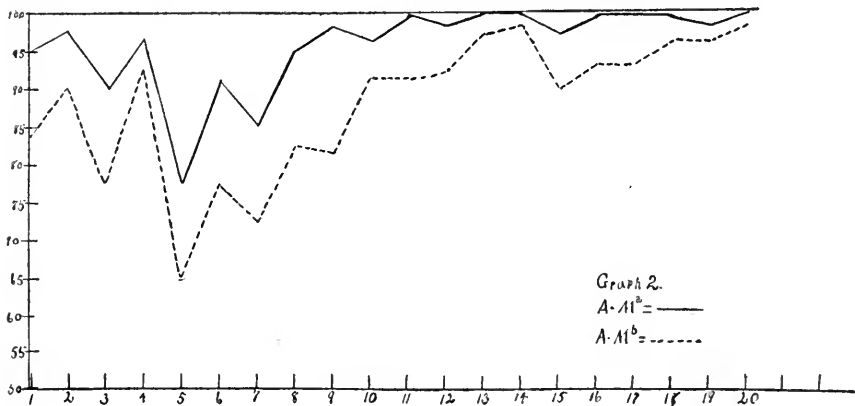
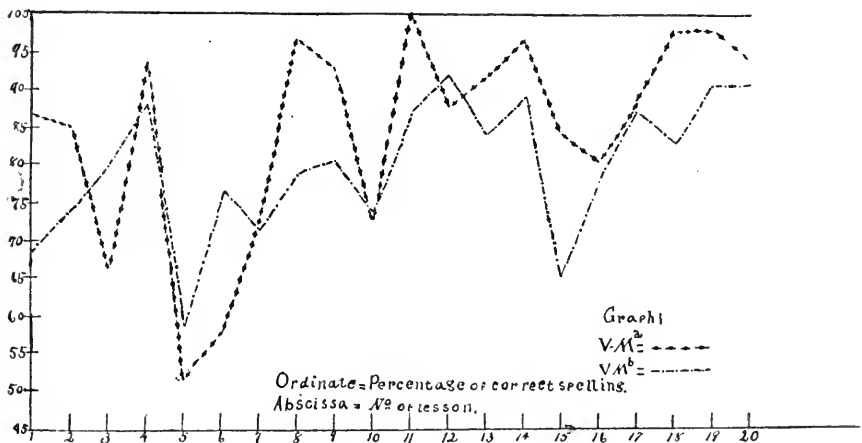
Second Series:																					
I.....	0	0	0	13	11	9	0	0	0	10	7	6	17	14	11	2	2	2	5	4	4
II.....	11	10	7	12	7	7	1	1	1	6	5	4	5	5	4	6	5	4	4	4	4
III.....	8	7	7	16	13	12	0	0	0	2	2	2	4	4	3	4	4	4	5	5	5
IV.....	4	3	3	11	9	7	0	0	0	1	1	1	1	1	1	5	4	4	2	2	2
V.....	17	13	9	37	28	24	2	2	2	11	8	8	2	2	2	15	13	9	7	7	5
VI.....	20	16	9	21	18	16	0	0	0	7	5	5	10	9	8	9	9	9	8	4	4
VII.....	12	10	7	14	11	9	0	0	0	7	5	4	1	1	1	11	9	7	8	6	6
VIII.....	2	2	1	16	14	13	0	0	0	3	3	2	3	3	3	8	6	5	7	5	5
IX.....	2	2	2	13	8	8	1	1	1	3	3	2	3	3	3	3	3	3	1	1	1
X.....	6	5	5	10	8	7	0	0	0	1	1	1	3	2	2	3	3	3	2	2	2
Total.....	82	68	50	163	127	112	4	4	4	51	41	35	49	44	38	66	58	50	46	38	38
Grand Total.....	291	249	161	425	328	282	73	68	60	211	186	132	231	198	152	297	247	194	246	213	181

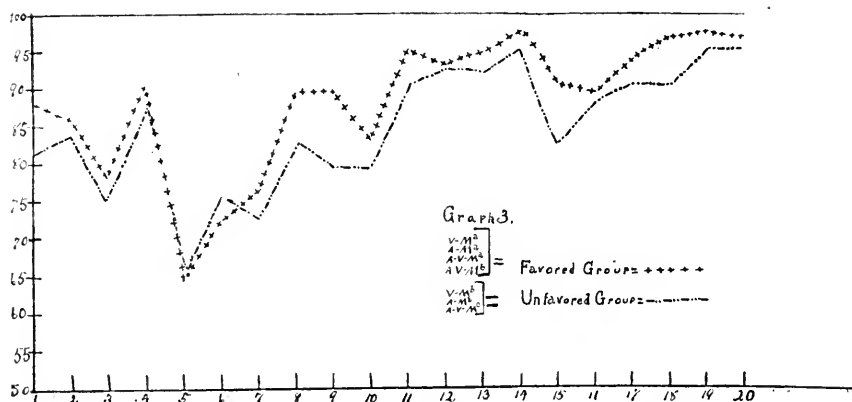
by 14.12 per cent. and 9.24 per cent., respectively, thus showing a greater progress in the learning rate of the Favored Section. Again, the V-Ma Section reduced its mean variation from 13.38 per cent. in the first series to 5.5 per cent. in the second, while the V-Mb Section actually increased its variation by 0.24 per cent. in the second series—additional evidence of the greater progress of the Favored Section.

The Favored Section of the A-M Group surpassed that of the Unfavored in correct spelling throughout the twenty lessons (see Table III). The difference in the average of the percentages of the first and second series of the Favored Section of this Group is smaller than that of the Unfavored. This fact cannot be interpreted, however, as due to a slower rate of learning, but rather to a much higher percentage attained by the Favored Section in the first series, thereby forestshortening the opportunity for progress. The Favored Section reduced its mean variation from 5.05 per cent. to 0.68 per cent., while the Unfavored stands 7.14 per cent. in the first and 2.63 per cent. in the second. A comparison of the results of the two Favored Mixed Sections, A-V-Ma and A-V-Mb, with those of the Unfavored, A-V-Mc, yields uncertain evidence. The percentage of correct spelling of the Unfavored exceeded the averages of the other two in thirteen out of twenty lessons, and the difference between the average percentages of correct spelling in the first and second series for this Section is 16.37 per cent., while that of the Favored Sections is only 15.07 per cent. Again, the former reduced the mean variation from 6.38 per cent. in the first series to 1.59 per cent. in the second and the latter from 6.6 per cent. to 3.56 per cent., respectively, for the same series, so that on all three counts the credit is to the Unfavored. Of the two Favored Sections of this mixed group, the "b" Section is largely responsible for this slow rate of learning, due, perhaps, to their low spelling ability and to the large number, 53.37 per cent., of *new* and *doubtful* words credited to them. Attention is called to the results of this Section because they employed all the usual modes of learning known to current pedagogy. Were they embarrassed by so many methods? Their introspections

show throughout that they were favored rather than embarrassed by the methods.

A comparison of the Unfavored and Favored Sections as a whole shows that the Favored have a higher percentage of correct spelling in every lesson of the first series save in the fifth and sixth, and that in the second series they excel in every lesson. The comparative results of the two Sections are expressed in Graph 3. All Sections commented on the unusual number of difficult and strange words in the fifth and sixth lessons, which accounts for the excessive decline of the graphs at these points. And that the curve of the Favored should





dip below that of the Unfavored is probably due to the fact that the V-Ma and the A-V-Mb Sections encountered a larger proportion of unfamiliar words at that point. The relation between the curves of the V-M group in Graph 1 justifies this view, in that the Favored dip far below the Unfavored. In the second series the curves of both Sections decline again in Graph 3 at the fifth lesson (fifteenth in the whole series), but this time the Unfavored suffer most—an indication that the conditions did not permit them to learn as many words. The relation of the curves in the nineteenth and twentieth lessons suggests that the Unfavored are there overcoming their handicaps.

Errors.—There were in all 1774 errors, 1313 of which occurred in the first series, 461 in the second. One hundred and forty-four mistakes, classed as “false impressions,” due to faulty pronunciation by the monitors, are omitted from the following account of errors. The remaining 1630 were classified according to the rubrics indicated in Table IV. This classification, following the lead of Prof. O. P. Cornman (2, pp. 26-29) in his studies of spelling errors, is based on the assumption that errors are due to incoördinations of the sensori-motor mechanism. “It is possible to distinguish between error due to some imperfection of the motorial elements of the spelling process—and those errors which result from some defect in the assimilation of sensory elements, an incoördination on the

TABLE III.
Percentages of Correct Spelling.

SERIES I.									
Favored.					Unfavored.				
	V-M ^a	A-M ^a	A-V-M ^a	A-V-M ^b	Total.	V-M ^b	A-M ^b	A-V-M ^c	Total.
I.....	83.3	96.0	78.8	96.0	87.52	68.8	83.8	90.0	80.86
II.....	85.0	97.5	86.3	75.0	85.95	73.8	90.0	86.3	85.70
III.....	66.3	90.0	86.3	71.3	78.47	80.0	77.5	70.0	75.83
IV.....	93.8	96.3	86.3	83.8	90.05	87.5	92.5	83.8	87.93
V.....	51.2	77.5	65.0	62.5	61.09	58.8	65.0	68.8	64.50
VI.....	57.5	91.3	70.0	70.0	72.20	76.3	77.5	71.3	75.03
VII.....	72.5	85.0	78.8	70.0	76.56	71.3	72.5	75.0	72.46
VIII.....	96.3	95.0	86.3	80.0	88.40	78.8	87.5	82.5	82.93
IX.....	92.5	98.8	82.5	83.8	89.40	80.0	81.3	77.5	79.60
X.....	72.5	96.3	87.5	77.5	83.45	73.8	91.3	83.8	82.06
Total Aves..	77.40	92.27	80.78	76.39	81.71	74.91	81.80	78.90	78.56
	V-M ^a	A-M ^a	A-V-M ^a	A-V-M ^b	Total.	V-M ^b	A-M ^b	A-V-M ^c	Total.
I.....	86.3	91.3	91.3	95.0	90.86	86.3	91.3	95.0	90.86
II.....	91.3	95.0	95.0	92.37	92.37	91.3	92.5	95.0	92.37
III.....	88.8	97.5	95.0	95.32	93.3	91.3	97.5	95.8	91.70
IV.....	88.8	97.5	97.5	97.52	88.8	98.8	97.5	97.5	95.03
V.....	88.8	95.0	90.0	93.8	82.49	95.0	93.8	93.8	87.49
VI.....	88.8	95.0	93.8	95.0	89.40	88.8	93.8	95.0	88.76
VII.....	93.8	95.0	93.8	93.77	93.8	93.8	95.0	93.8	93.77
VIII.....	96.3	96.3	92.5	96.57	96.57	92.5	96.3	96.3	96.57
IX.....	90.0	98.8	98.8	97.20	90.0	98.8	98.8	98.8	97.20
X.....	90.0	98.8	98.8	95.43	95.43	90.0	98.8	98.8	95.43
Total Aves..	91.44	95.27	94.91	94.58	94.58	91.44	94.91	94.58	94.58

TABLE IV.
Analytic Classification of 1600 Sensory and Motor Errors.

	SERIES I.						SERIES II.					
	Favored Sections.			Unfavored Sections.			Favored Sections.			Unfavored Sections.		
	V-Ma	A-Ma	A-V-Ma	V-Mb	A-Mb	A-V-Mb	V-Ma	A-Ma	A-V-Ma	V-Mb	A-Mb	A-V-Mb
	%	%	%	%	%	%	%	%	%	%	%	%
	Totals.			Percentage of average.			Totals.			Percentage of average.		
Motor Errors:												
a. Simple.												
1. Omission.....	1,226	245	1,349	2,024	1,212	79	1,534	1,288	859	1,226	60	982
2. Addition.....	552	184	245	307	322	21	1,043	491	613	1,716	35	352
3. Change.....	1,349	920	1,717	2,209	1,549	101	2,086	1,472	1,288	1,615	79	920
4. M and N.....	00	00	061	00	015	1	397	00	067	124	6	00
Percentage of totals.....	3.128	1.349	3.374	4.539	3.098	202	4.969	3.252	2.822	3.681	180	1.963
b. Suggestion.												
1. Transposition.....	123	00	552	368	261	17	245	429	429	368	18	00
2. Wrong letter doubled.....	00	00	061	061	031	2	061	00	061	011	2	00
3. Sensori-Motor Attraction.....	245	00	123	061	107	7	061	061	184	102	5	00
4. Idio-Motor Attraction.....	1,043	429	575	859	752	49	552	613	920	695	34	061
Percentage of totals.....	1.411	429	1.411	1.349	1.150	75	920	1.102	1.595	1.206	59	061
Percentage of total motor errors.....	4.539	1.779	4.785	5.889	4.219	277	5.889	4.356	4.417	4.880	239	2.024
Sensory Errors.												
a. Phonetic.												
b. Confusing.												
1. Confusable, ble, etc.	2,024	1,411	1,103	1,656	1,549	101	3,374	1,717	1,717	2,270	111	982
2. Doubling.....	2,761	429	2,577	4,233	2,500	163	3,313	1,288	3,558	2,714	133	1,103
3. Non-Doubling.....	1,165	307	798	368	660	43	1,165	0798	1,411	1,125	55	307
Percentage of total sensory errors.....	6.809	2.270	5.644	7.117	5.460	356	8.650	4.785	7.177	6.871	336	2,577
Percentage of grand totals.....	11.349	4.049	10.429	13.006	9.708	633	14.539	9.141	11.594	11.758	575	4.601
Percentage of grand totals.....	11.349	4.049	10.429	13.006	9.708	633	14.539	9.141	11.594	11.758	575	4.601
Percentage of grand totals.....	11.349	4.049	10.429	13.006	9.708	633	14.539	9.141	11.594	11.758	575	4.601

receptive side of the language process, evidenced by the incorrect association of the letters in the written words.”

The motor errors (see Table IV) were divided into eight classes, four of which were termed *simple*, and four, owing to their relation to suggestive processes, were classed under *suggestion*. The four classes of the former are:—*omission*, *addition*, *change* and *interchange of m and n*. These sub-classes need no further definition. The motor errors classed under suggestion may best be explained by examples:—*Transposition*, as *Beduoin* for *Bedouin* or *byrel* for *beryl*; *Wrong letter doubled*, as *abbattoir* for *abattoir* or *Lyonnaise* for *Lyonnais*; *Attraction*, *Sensori-motor*, *betel-nut* for *betel-nut* or *annesia* for *amnesia*. This class of errors involves an incorrect repetition of a prominent letter in the word, or it may involve the insertion of a letter or combination of letters involved in a previously written word, *e. g.*, *exceedible* (exceedable) follows *evincible*, also *bandana* (bandanna) follows *banana*; *Attraction*, *Ideomotor*, these errors consist in the substitution of a letter or arrangement of letters from a somewhat similar word in the lesson or from an irrelevant associated word. Examples of the former are *indefensible* (indefensible) followed later by *inducible* and of the latter are *gargoil* (gargoyle) and *grystal* (gristle), associated, respectively, with *recoil* and *crystal*, words that did not occur in the lesson.

The sensory errors fall into two large groups, *Phonetic* and *Confusion*. The phonetic errors of our language are legion and call for no illustration. Confusing errors are of three classes, *Special cases*, *Doubling*, and *Non-doubling*. Confusing errors are shown both in letters and in syllables. Of letters often confused were, *y* and *i*; *s*, *c* and *z*; *e*, *ch* and *k*; *e* and *i*; *f* and *ph*; and of syllables, *er*, *ar* and *ir*; *ae* and *ea*; *ei* and *ie*; *al*, *le* and *el*; *il*, *ile*, *ecl* and *elo* and *eal*; *u*, *eu*, *ieu* and *eue*; *si* and *ei*; *ice* and *ise*; *cian* and *tian*; *cion* and *tion*; *cal* and *cle*; *ant* and *ent*; *cleis* and *clys*; *cous* and *ious*; *deen* and *dine*; *cene* and *cine*; *oil* and *eyle*; *able* and *ible*; *clep* and *clyp*. The errors of *doubling* consist of using double letters for single ones, as *Dannish* for *Danish*; and those of *Non-doubling* are self-evident. Confusing errors may at times be purely phonic, especially those of similar pronunciation, *e. g.*, “ice” in *chalice* was spelled phonetically “is,” and then again it was confused with “is” in *clevis* and *aphis*, and this according to the Cornman classification might be considered sensori-motor-attraction, instead of a phonic confusion. Off-recurring instances of this type and of still others raised a question as to the usefulness of Cornman’s classification.

The basis of his classification is fundamental in that it assumes that the errors are due to defects in parts of the sensori-motor mechanism, yet it leads to confusion, for it fails to separate errors of *fact* from errors of *cause*. Spelling errors of fact are of four kinds and only four:—omission, addition, transposition and substitution. We may dogmatize about these, for they permit definite and exact classification. But we do not yet know the number of causes of errors; oftentimes, the number of causes of even one error cannot be determined. The mixture of these two forms of errors—fact and cause—produces difficulties of this sort; *appall* is spelled *appal*. Is this a sensory error of non-doubling, or an error of the ideomotor type? Of course, as to fact, it is an error of omission and nothing else. Again, *liturgic* is spelled *littergie*. Is this an ideomotor, or a sensory error of the phonic type? As an error of fact, it is substitution. To spell *guerilla* as *gorrilla* may be either a phonic error or a form of motor lapse, but as to the error of fact there can be no doubt. Again, an error may be the joint product of both sensory and motor causes. For these reasons, it would seem to be in the interest of clearness and accuracy to classify errors *first* as to fact and then ascribe the most probable cause or causes; this would prevent motor and sensory causes from mutually excluding each other. The Cornman method is here used because the monitors based their records upon it, while the one here suggested occurred to me later in working over their records.

Table IV shows the distribution of errors among the several Sections. In general, the percentages of sensory errors exceed those of the motor in both series for all Sections. The percentage of the average of the grand total of errors for the Favored and Unfavored in the first series is 9.708 per cent. and 11.758 per cent., respectively, and in the second series 2.914 per cent. and 4.744 per cent., thus showing that the Favored progressed approximately 1.3 times faster than the Unfavored.

Motor errors were eliminated 1.5 times faster and sensory errors 1.2 times faster by the Favored than by the Unfavored. If the elimination of motor errors is due to an improvement in the habit-mechanism, then it appears that the Favored Group acquired this segment of the spelling arc more rapidly. Motor errors of suggestion, sensory errors of the phonic and of the confusion types were eliminated, respectively, by the Favored 2.4, 1.8 and 1.00 times faster than by the Unfavored. The Unfavored eliminated 1.27 times as many errors of the *doubling* as the Favored, while the latter in turn eliminated 1.8 times as many errors of *non-doubling*, from which it seems that an individual spelling with his type tends to double the letters, while one spelling against it omits required repetition. Is this an illustration of Baldwin's "self-imitation" under favorable conditions of expression? Both groups make the least progress with *confusing* errors.

A somewhat finer measure of comparative progress is found in the ratio of "wrong-words" to errors. If the wrong-words and errors are equal, the ratio is unity. The better the speller, the greater are the chances for the ratio becoming unity, *e. g.*, the A-Ma section proved to be the best spellers and in the second series their ratio of wrong-words to errors is unity. In the first series these ratios are 22/42 (V-Ma), 37/42 (A-Ma), 28/42 (A-V-Mb), 24/42 (A-V-Mb) and for the Unfavored 28/42 (V-Mb), 24/42 (A-Mb), 28/42 (A-V-Mc); in the second series they stand, Favored 25/42 (V-Ma), 42/42 (A-Ma), 32/42 (A-V-Ma), 32/42 (A-V-Mb); Unfavored 28/42 (V-Mb), 28/42 (A-Mb), 30/42 (A-V-Mc). These values show that the Favored increased their ratio 5/42 and the Unfavored 2/42.

Aids.—The A-Ma and A-V-Mb considered and used syllabi-

cating as an aid. The A-V-Mc section was required to use it, and found it a hindrance during the first series, though it proved an aid as the end of the second series approached. The A-Mb and the A-V-Ma reported aid from the writing movement; all of these *S*'s save K. K. were graph-motor. The A-V-Mb found its own pronunciation an aid, and all of the mixed group mentioned rules of spelling as an aid.

Difficulties.—All our subjects unite in saying that double consonants, confusing letters and syllables, and similar sounds of different letters are difficulties; all Unfavored reported frequent inability to image the words in their dominant type during the first series, the difficulty decreased in the second. M. Ch. says: "I seem so dependent upon visual imagery for correct spelling that after the words are pronounced I must see them syllable by syllable before writing them. If the word is unfamiliar, I visualize it as I spell it. With familiar words I am independent of imagery."

Doubt.—"Anticipatory processes" are likely to create doubt, as all *S*'s reported. These processes are more numerous in spelling unfamiliar and partially learned words, and the extent of their vividness appears to be a rough measure of the degree of doubt. The manner of the monitor's pronunciation to the V-Mb and the A-Mb sections created doubt.

Certainty.—All sections considered "report processes" as producing certainty of the accuracy or inaccuracy of the spelling product. The auditory types reported that both the sound and speech-motor perceptions increased certainty. The visual image increased certainty for the V-Ma and the "b" and "c" sections of the mixed groups, as did the sound of the letters, of the words, of own voice and voices of others in the A-Ma, A-Mb and in the "b" and "c" sections of the mixed groups.

Distractions.—Consciousness of having missed a word, loud talking, others working in the same room, students passing to classrooms, fatigue, uncomfortable temperature, were common distractions. The Unfavored groups were distracted during the first series by the imposed conditions, but as indicated above, this source of disturbance was considerably lessened in the second series. The thought of other school work and the brief time in which to write introspections were disturbances.

SUMMARY AND COMMENT.

1. The Favored Sections eliminated all forms of motor errors and nearly all forms of sensory more rapidly than the Unfavored.

2. Using a subordinate receptive mechanism of a spelling arc caused a greater check on the learning rate than the use of a less preferred emissive mechanism.

3. It appears that where an arc has been established conformable to the individual's dominant imaginal type, if words be presented to a subordinate type, they may be translated into the imagery of the preferred type.

4. Interference with the preferred form of expression proved a handicap in the first series, but became a negligible quantity toward the end of the second; on the contrary, interference with the dominant receptive mechanism persisted fairly uniformly throughout both series.

5. The several possible components of the spelling arc have their greatest significance during the learning stage, and the less serviceable are eliminated as the habit stage approaches [inferred from the subjects' introspections].

6. Anticipatory processes are likely to create doubt, while report processes produce certainty.

It was the intention to submit a new list of 400 words to the same subjects under similar procedure, but with the difference that the Favored and Unfavored Sections should exchange places. Such a course seems highly desirable in work of this kind, both as a check and as a means of detecting sources of error.

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SOME OBSERVATIONS ON THE LEARNING OF SENSIBLE MATERIAL.

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SUMMARY.

Three experiments were made on the Learning of Sensible Material with the object of discovering whether the position of facts in a series has any such influence on their likelihood of being remembered as has been shown to be the case with nonsense material. The material used in this experiment consisted of (1) a lecture entitled "Fifty Years of Punch," (2) a lesson on buds, (3) two courses of lessons, one in chemistry and the other in nature study, extending over a term of three months.

In all cases it was found that position in the series had negligibly small influence upon remembrance in comparison with effects due to other causes.

THE "LECTURE" EXPERIMENT.

A lecture was given at Sexey's School, Bruton, on "Fifty Years of Punch," illustrated by lantern slides. The lecture presented a series of slides taken from pictures which had appeared in Punch, and each slide was briefly described by the lecturer. Attendance at the lecture was purely voluntary, but a large proportion of the scholars were present. The lecture lasted an hour and a half.

Eight days later those who had been present at the lecture were asked to submit themselves to a memory test. Thirty of those who had attended expressed their willingness to do so, and they were then asked to write down in as brief a manner as possible a recognizable description of each of the slides they had seen. In most cases a single phrase was enough to indicate whether a particular slide had been remembered or

not, but in a few ambiguous cases the writers were asked privately for a fuller verbal explanation. In this way the number of individuals who remembered each slide was determined with practical certainty. The following table shows the numbers of individuals who recalled each slide of the series. No frequencies are recorded against numbers 8, 12, 45, 47, 49, 53, 58, 61, 64, 67, 72, 73 on account of an ambiguity in the printed list of slides by means of which these results were corrected.

TABLE I.—*Frequency with which slides of Punch lecture were remembered.*

No.	Frequency.	No.	Frequency.	No.	Frequency.	No.	Frequency.
1	13	21	8	41	6	61	..
2	14	22	12	42	9	62	4
3	24	23	14	43	2	63	4
4	9	24	18	44	2	64	..
5	12	25	8	45	..	65	3
6	15	26	6	46	0	66	5
7	12	27	2	47	..	67	..
8	..	28	7	48	1	68	1
9	7	29	11	49	..	69	5
10	11	30	7	50	3	70	5
11	4	31	3	51	3	71	1
12	..	32	21	52	7	72	..
13	8	33	1	53	..	73	..
14	14	34	5	54	6	74	0
15	2	35	1	55	3	75	6
16	12	36	6	56	10	76	2
17	16	37	7	57	1	77	13
18	17	38	4	58	..	78	0
19	30*	39	10	59	0	79	6
20	9	40	10	60	7	80	2

*Number 19 was described to those who were being tested as an example of the way in which results were to be written down. It accordingly appears on every paper.

COMPARISON OF THIS RESULT WITH THE RESULT OF LEARNING A NONSENSE SERIES.

Bolton¹ has shown that of a series of figures arranged in a meaningless order, those near the ends of the series are most likely to be remembered. He writes on this point: "This will be true of any series of successive ideas. They are permanent in inverse order as they are removed from the beginning, except the last two or three, which are permanent in their order from the last."

The series of ideas forming the subject of this experiment shows, like Bolton's, a gradual falling off as we pass along it

(1) American Journal of Psychology, iv, 1891, p. 362.

from the beginning with a rather questionable rise again at the end. This is more clearly seen if the results are grouped so as to show the average frequency of positions of the curve lying between successive minima:—

TABLE II.

Group	1-15	16-27	28-35	36-46	47-59	60-74	75-80
Average frequency	11.2	11.1	7.0	5.6	3.8	3.5	4.8

It is certain, however, that there are other causes at work which produce fluctuations much greater than any effect due merely to position.

THE LESSON EXPERIMENT.

A lesson on buds was given independently to two forms, which contained 16 and 21 boys, respectively. The facts of the lesson were derived from observations made by the class under the direction of the teacher. The facts may be classed in three groups, and in giving the lessons the groups of facts were arranged in different orders. The following scheme shows the order in which the groups of facts were taken in the two classes:

FORM I—16 BOYS.

1. Arrangement of Scales.
2. Contents of buds.
3. Arrangement of buds on shoot.

FORM II—21 BOYS.

1. Arrangement of buds on shoot.
2. Arrangement of Scales.
3. Contents of bud.

Each class was tested by a short series (10) of oral questions at its next meeting. These questions were framed with the most scrupulous care to avoid suggesting answers (which is one reason why so few were used), and were asked in the same order on both occasions. Questions were chosen which could be answered by a single word or a short sentence.

The answers were arranged in three groups, according to the section of the lesson with which they dealt, and the percentage of frequency of correct answers was determined. In this way the following table was computed:

TABLE III.

Subject of Question.	Form I.		Form II.	
	% Frequency of correct answer to each question.	Average % Frequency of correct answer to question in each group.	% Frequency of correct answer to each question.	Average % Frequency of correct answer to question in each group.
Scales of single bud.	{ 37.5 37.5 }	37.5	{ 89.5 19.1 }	54.3
Contents of bud.	{ 68.9 87.5 37.5 43.8 }	59.4	{ 89.5 76.2 66.7 38.6 }	67.8
Arrangement of buds.	{ 62.5 43.8 18.8 31.3 }	39.1	{ 89.5 89.5 33.3 38.6 }	62.7

Inspection of the right-hand columns under Form I and Form II, respectively, shows that the probability of obtaining a correct answer is greatest for a question in Section II, next greatest for Section I and least for Section III, although the subject-matter of these sections occupied different positions in the lessons given to the two forms. The fact that pupils of Form II are more likely to get a correct answer in any section than those of Form I is explained by their greater age and by their previous training, since a number of them had already passed through Form I.

These results strongly confirm those of the "lecture" observations. When a series of facts having a rational relation to one another is learnt, the chance of their being remembered depends to a negligible extent upon the order in which they are presented, and much more upon entirely different causes.

EXPERIMENTS LASTING FOR A WHOLE TERM.

Form III was examined on a single term's work in chemistry by means of carefully-arranged short questions of the same character as those suggested in the last experiment. Forms I and II, in both of which the pupils had been doing the same work, were examined in the same way in nature study. The answers were then corrected and the results arranged in the order in which the facts had been dealt with during the term. These results are shown in Tables IV and V. The frequencies indicated are *actual*, not percentage, frequencies.

TABLE IV.—*Frequency with which facts dealt with in a course of Nature Study lessons were remembered by Forms I and II.*

No. of Question.	Frequency of Correct Answer.	No. of Question.	Frequency of Correct Answer.	No. of Question.	Frequency of Correct Answer.	No. of Question.	Frequency of Correct Answer.
1	34	11	36	21	8	31	33
2	37	12	36	22	19	32	29
3	31	13	34	23	24	33	24
4	32	14	36	24	28	34	27
5	24	15	35	25	28	35	33
6	17	16	31	26	34	36	28
7	27	17	26	27	34	37	26
8	36	18	30	28	27	38	25
9	7	19	19	29	29	39	9
10	25	20	30	30	33	40	33
							50
							32

TABLE V.—*Frequency with which facts in a course of Chemistry lessons were remembered by Form III.*

No. of Question.	Frequency of Correct Answer.	No. of Question.	Frequency of Correct Answer.	No. of Question.	Frequency of Correct Answer.	No. of Question.	Frequency of Correct Answer.
1	33	11	28	21	21	31	14
2	27	12	25	22	25	32	23
3	28	13	15	23	33	33	12
4	21	14	17	24	23	34	28
5	33	15	14	25	28	35	19
6	28	16	28	26	26	36	18
7	22	17	13	27	9	37	16
8	24	18	19	28	22	38	10
9	17	19	16	29	32	39	25
10	18	20	13	30	15	40	26
							50
							13

Tables VI and VII present the results grouped so as to show the average frequency of portions of the curve lying between successive minima, as in Table II.

TABLE VI.—*Grouping of the Results of Table IV.*

Group	1-9	10-21	22-39	40-50
Average frequency	27.2	28.8	26.6	27.1

TABLE VII.—*Grouping of the Results of Table V.*

Group	1-17	18-38	39-50
Average frequency	23	20.1	20.2

These results agree perfectly with the previous ones. In both cases there is only the slightest indication (in one case none) that special parts of the series are remembered better than others in virtue of their position. In any case such differences as do occur are completely insignificant in comparison with larger fluctuations due entirely to other causes.

When a series of meaningless syllables is learnt they are connected in the mind by associations depending almost entirely on their contiguity in space or time. In rational learning, on the other hand, the associations formed depend almost entirely on associations by similarity with various facts, many of which form no part of the memorized series at all, but have been present in consciousness before. The learner, in fact, builds up in his own mind a number of series concurrently, and when a new fact is presented to him he places it in what seems to him its correct position in some series already in his mind.

Other things being equal, the beginning and the end of a lesson are the best places for facts which have to be remembered; generally speaking, however, other things are *not* equal, and it is not worth while to alter the natural sequence of the facts in order to bring any particular fact to the beginning or end.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

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EDITORIALS.

It is natural for men and women to seek that type of pre-eminence among their fellows which is represented by election to office. It is essential and therefore justifiable for a man or a woman who wishes to establish a principle or a policy to stand explicitly for an office of power and influence, and to work frankly for his or her own election. The notion that the ballots of an electorate will be given spontaneously to the most competent individual is an anachronism in the theory of democracy.

Accepting these two conditions, however, there are certain limits beyond which the game of politics should be prohibited. The critical stage of educational development through which we are now passing imperatively demands that all personal, sectional and partisan interests be absolutely and rigidly eliminated from the elections of the N. E. A. Whether a candidate comes from the East or from the West, from the North or from the South, should make not the slight-

est difference. Whether the candidate is a man or a woman ought not to be a factor in the selection. Education has problems to solve that are far too significant and insistent to be relegated to the background while educators engage in a petty squabble over matters that are of purely personal, sectional or partisan consequence. If the N. E. A. is to be a constructive force in the solution of these problems, it must be imbued with the truly social and democratic spirit: to paraphrase one of Thorndike's statements, it must stand firm on the principle that it is of small moment who is at the top or who is given the power to achieve something for the common good; it is a matter of vital import that the top be high and that much be achieved.

The great danger in the present methods of selecting our titular leaders is that they are likely to favor the person who itches for the title rather than for the opportunity, and to handicap the person who could do much with the opportunity, but who shrinks from the methods that alone would enable him to enjoy it. W. C. B.

In spite of an unusually good program at the Chicago meeting of the N. E. A., the attention of the public and of a certain proportion of the membership was concentrated upon "political" **POLITICS IN** issues. The stenographic report of the Wednesday **THE N. E. A.** noon business meeting (if it is printed *verbatim*) will make interesting reading for the future historian of twentieth century civilization. (And this historian, by the way, will study our educational documents pretty carefully whether we wish him to or not.) To make the picture complete, however, it would be necessary for him to have both phonographic and kinetoscopic records of the proceedings. It was a spectacle of which present-day education can scarcely be proud,—and yet it had its value.

If the N. E. A. is a force for either good or evil in American education (and it certainly is a force), we should be glad to know how its policies are directed. The candor that characterized Miss Strachan's address was refreshing, and her statements relating to the manner in which her candidacy for the office of president had been met were not denied, although counter charges were presented relating to alleged phases of her own activity. If either secret caucuses or attempts to influence teachers through Mayors and boards of education are essential to the effective management of the N. E. A.,

the general membership should be informed of the situation. It is possible, of course, that so large and important an organization can be operated only by the methods of political manipulation,—the “packing” of meetings, the use of “influence” and pressure, and the various other devices by means of which the policies of the few may be made to “represent” the unanimous judgment of the many. It is conceivable that the welfare of the many is adequately conserved and promoted by these methods. It is possible that these are the only methods that will “get results.” But if all this is true, why not admit once and for all that democracy is a failure, that its apparent triumphs are only artifacts, and that back of the pretty puppets through which the collective will of the group appears to be expressed two or three or fifteen or twenty individuals really pull the strings and work the “whole show?”

W. C. B.

The Police Commissioner of New York City has complained that some of the city magistrates are nullifying the efforts of the police, defeating the ends of justice, and fostering

THE EFFECTS OF THE PROBATION SYSTEM. crime by an indiscriminate use of probation methods and suspended sentences. It is claimed that of some six thousand convictions for crimes and misdemeanors during the past year over four thousand have been followed by suspended sentences or some form of probation. This leniency, it is charged, has been interpreted as license by the criminal world, crime is committed with a deliberate expectation of a suspended sentence, and the police find themselves powerless to cope with criminal activities.

In his recent report as director of the Gatzert Foundation, Dr. Stevenson Smith points out that leniency toward criminals is most successful when it is first practiced, and that as probation becomes more general it is less effective. The value of probation depends entirely upon the mental attitude of the probationer. We need much more careful studies of individual cases with reference to the mental habits previous to the crime, and the attitude of the culprit toward his crime and toward society after his conviction, in order to secure the best results from the probation system.

J. C. B.

The advent of the Binet-Simon tests has stimulated investigation of the correlation between mental and chronological age, and recent studies in school retardation have drawn attention forcibly to the correlation between chronological age and pedagogical age. Less attention seems, however, to have been accorded to the several attempts to devise tests for physiological age. Yet, if a satisfactory objective measure of physiological development could be secured, the way would be opened for mass tests of the interrelations of these four ages. For, in theory, any child may exhibit retardation or acceleration in any one of these four ages when it is related to any other one of them. Thus far, the tests of physiological age which have been suggested are the progress of dentition, the presence or degree of development of pubescence, stature and the epiphyseal development of the wrist-bones, as determined by the Röntgen-ray method. So far as we know, no one has attempted a thorough-going experimental comparison of these several methods of determining physiological age, though not until this has been done can we proceed to the study of the interrelations of the four ages under consideration. Moreover, the results now available are conflicting. Dr. W. L. Foster believes that the relation of stature and pubescence is so close that a practical grouping of pupils could be made on the basis of stature alone. Dr. Rotch declares that height and weight might correspond with chronological age, but delayed mental development would be indicated by the metabolism of the epiphyses. Again, Foster's statistics show that discharges from the secondary school are more numerous in the more mature pupils and promotions more frequent in the less mature pupils of the same class, whereas Crampton asserts that in the secondary school the immature (pre-pubescent) boys of all ages present many more instances of failure in school work. Into the validity of these various assertions this is not the place to go; they are cited to call attention to the need of further experimental and statistical study of the correlation of chronological, pedagogical, psychological and physiological age.

G. M. W.

NOTES AND NEWS.

The Institute of Applied Psychology, in Berlin, announces that the recent exhibition of the materials and resources of the Institute at the congress of experimental psychology was highly successful, and was visited by a large number of teachers and laymen. So great was the interest manifested that the Prussian Minister of Education offered the Institute a room in the building of the German Educational Museum of the City of Berlin for a permanent exhibit of its collections, and they may now be seen there any afternoon from 4 to 6. At the suggestion of the International Union for the Advancement of Science, it is proposed to enlarge the collections of test materials, with a view to making the Institute a "Center for Psychographic Investigations."

One hundred and twenty-four Pittsburgh teachers enjoyed the benefits of the Educational Fund this summer, having their expenses paid during their attendance at summer schools. Of these, thirty-three went to Columbia, thirty to Carnegie Institute of Technology, nineteen to Chatauqua Summer School, fourteen to Harvard, six to Cornell and the remainder to various institutions. This fund of a quarter of a million dollars, given by an anonymous donor, has enabled over three hundred Pittsburgh teachers to attend summer sessions, and has been productive of excellent results making for greater efficiency in the schools.

The use of the kinetoscope as an educational agency is receiving attention in several quarters. New York City is to equip one hundred schools with machines, while Detroit plans to use these machines not only in the schoolroom, but also in outdoor evening entertainments at various playgrounds.

It is proposed during the coming year to make a thorough trial of the Courtis standard tests in arithmetic in the public schools of Detroit to determine the possibility of measuring scientifically the results of the teaching of arithmetic in the elementary schools.

Swarthmore College announces a complete reorganization of its department of psychology and education under the direction of Dr. Bird T. Baldwin, formerly head of the School of the Art of Teaching in the University of Texas. Courses will be given in general and educational psychology, school supervision, principles and practice of teaching and experimental education. Opportunities will be given for practice teaching in the public schools, and for special studies of industrial education and the education of defectives and delinquents.

An anonymous gift of \$10,000 to the library of Oberlin College will be used, in part, to secure a complete collection of the recent publications on Eugenics.

Professor Karl Pearson recently delivered an address on the subject of "Eugenics and the Public Health" before the Congress of the Royal Sanitary Institute, held at York, England.

Dr. Clara Harrison Town of the Lincoln State School and Colony, Lincoln, Ill., has translated from the French Binet and Simon's little monograph, "A Method of Measuring the Development of the Intelligence of Young Children," which was published in the *Bulletin de la société libre pour l'étude psychologique de l'enfant*, April, 1911. This contains the revised form of the tests and the authors' directions for their application.

Professor Morton Prince, editor of the *Journal of Abnormal Psychology*, has retired from the chair of neurology in Tufts College Medical School, and has been made professor emeritus. He will be succeeded by Dr. J. J. Thomas, now assistant professor of neurology.

Dr. Henry H. Swain, for the past eleven years president of the Montana State Normal College, at Dillon, resigned at the close of the year, 1911-12.

Dr. C. A. Duniway, formerly president of the University of Montana, has been elected president of the University of Wyoming.

Dr. E. B. Craighead, president of Tulane University, of Louisiana, has accepted the presidency of the University of Montana.

Dr. Alexander Meiklejohn, professor of philosophy and dean of the faculty of Brown University, has been elected president of Amherst College.

Stephen S. Colvin, Ph.B. (Brown, '91), Ph.D. (Strasburg, '97), professor of psychology and director of the psychological laboratory in the University of Illinois, has accepted a chair in educational psychology in Brown University, newly established in co-operation with the State Board of Education, with the assistance of an appropriation made by the State Legislature.—*Science*.

Walter Fenno Dearborn, Ph.D. (Columbia), professor of educational psychology in the School of Education, University of Chicago, has been appointed assistant professor of education at Harvard University.

Harlan Updegraff, Ph.D. (Columbia), specialist in school administration, United States Bureau of Education, has been appointed professor of education and head of the department of education in Northwestern University.

Mrs. Mary Schenck Woolman, professor of domestic arts in Teachers College, Columbia University, has been elected president of the Women's Educational and Industrial Union.—*Science*.

L. R. Geissler, Ph.D. (Cornell), has resigned his position as research psychologist in the physical laboratory of the National Electric Lamp Association, Cleveland, to become professor of psychology at the University of Georgia. He will organize and direct the new psychological laboratory to be established in connection with the School of Education. The laboratory will occupy seven or eight rooms in George Peabody Hall, the new home of the School of Education now under construction, and will be furnished with all modern equipment.—*Science*.

Assistant Professor G. F. Arps, who has been acting head of the department of psychology of the University of Illinois during Professor Colvin's sabbatical year, has accepted a position in psychology in Ohio State University.

Lotus D. Coffman (Ph.D., Columbia, 1911) has been appointed to a professorship of education in the University of Illinois. During the past year Dr. Coffman served as lecturer in the School of Education, while still retaining the superintendency of the training department in the Eastern Illinois State Normal School.

Professor W. A. Jessup (Ph.D., Columbia, 1911) has been appointed dean of the School of Education at the University of Indiana.

Melvin E. Haggerty, Ph.D. (Harvard), assistant professor of psychology in the University of Indiana, has been advanced to an associate professorship in that institution.

Daniel Starch, Ph.D., instructor in psychology in the University of Wisconsin, has been made assistant professor of psychology.

Dr. Melbourne Stuart Read, professor of psychology in Colgate University, and secretary of the University, has been elected to the newly-established office of vice-president of the University.

Mr. William McDougall, F.R.S., well known for his contributions to physiological and social psychology, has been elected an extraordinary fellow of Corpus Christi College, Oxford.

George R. Wells, Ph.D. (Hopkins, '12), has been appointed instructor in psychology at Oberlin College.

Miss Ethel Andem has been appointed instructor in education at Wilson College.

Mr. Harry L. Miller, principal of the Kansas City High School, has been appointed to the principalship of the new model high school of the University of Wisconsin.

Mr. Gardner Cheney Bassett of Baltimore has been chosen university fellow in psychology in Johns Hopkins University.

William J. Hickson, M.D., has been appointed director of the division of medical research in the department of research of the New Jersey Training School for Feeble-Minded, at Vineland, N. J.

Mr. Edgar A. Doll (A.B., Cornell, 1912), who has lately served as assistant in psychology at the University of Wisconsin and as assistant in educational psychology at the summer session of Cornell University, has been appointed research assistant at the Vineland, N. J., Training School for Feeble-Minded Children, where he will devote his time to the investigation of special problems under the direction of Dr. H. H. Goddard.

Harry Miles Johnson, Ph.D. (Hopkins, '12), has been appointed psychological assistant in the physical laboratory of the National Electric Lamp Association, Cleveland, Ohio.

Principal Morgan of the training department of the Western State Normal School at Macomb, Ill., has been promoted to the presidency of the school, taking the position made vacant through the death of the late Alfred Bayliss.

Superintendent Frank B. Dyer of Cincinnati, Ohio, has been elected Superintendent of Schools in the City of Boston at a salary of \$10,000 per year.

PUBLICATIONS RECEIVED TO JULY 1, 1912.

(Notice in this section does not preclude a more extended review.)

W. BETZ. *Ueber Korrelation*. Leipzig: J. A. Barth, 1911. Pp. 88. M. 3.

A careful study of the nature of correlation, of the methods employed in its determination and of its significance for the measurement of mental capacity.

EDWIN G. COOLEY. *Vocational Education in Europe*. Report to the Chicago Commercial Club. Chicago: R. R. Donnelley & Sons Co., 1912. Pp. 347.

The greater part of this report is given over to a systematic account of industrial and vocational education in Germany. Two chapters are devoted to Austria and one to Switzerland. A final chapter embodies Dr. Cooley's recommendations regarding the direction of vocational education in America. These may be briefly summarized as follows: (1) The apprenticeship system should be revived and reorganized, but under the provision that the education of children between the ages of fourteen and eighteen should be distinctly provided for, and that those who employ children between these ages should assume part of the responsibility for such education. (2) The years six to fourteen "should be preserved for general cultural education." (3) The most important part of the education from fourteen to eighteen should be represented by vocational continuation schools demanding from six to ten hours' work each week, this to be "day" work, primarily technical in its nature, although not negligent of cultural aims. (4) Provision for vocational guidance is essential. (5) Vocational schools must be administered co-operatively by schoolmen and men from the vocations and trades. The report contains a large amount of valuable material, but unfortunately lacks an index.

JUNE E. DOWNEY. *The Imaginal Reaction to Poetry. The Affective and the Aesthetic Judgment*. Bulletin No. 2, Department of Psychology, University of Wyoming. 1912. Pp. 56.

Visual imagery exceeds any other type in every case. Indeed, visual images constitute almost half of the total images reported. In three cases the olfactory imagery played an important rôle, and in all cases the organic, kinaesthetic and optical-kinaesthetic images were fairly frequent, and added much to the vividness of the affective reaction. In many cases there was a decided difference between the

affective judgment "pleasing" and the aesthetic judgment "beautiful." The basis of the latter seemed to be more intelligent and reflective than the former, and consisted largely of the recognition of skill in verbal manipulation.

SAMUEL CHANDLER EARLE. *The Theory and Practice of Technical Writing*. New York: The Macmillan Company, 1911. Pp. vii, 301. \$1.25 net.

An interesting compendium on style for engineers and others who have occasion to express themselves on technical subjects. Part I deals with the general principles of logical structure, and Part II discusses the practical application of these principles to the problems of the technician. Throughout the book there are copious examples drawn from technical literature. Anyone who has had much experience with the manuscripts of scientific men will appreciate the need for such a course in technical writing, and the present textbook seems to meet the requirements admirably.

GUY G. FERNALD. *The Defective Delinquent Class: Differentiating Tests*. Reprinted from the American Journal of Insanity, 68: No. 4, April, 1912. Pp. 523-594.

A very interesting study of the mental abilities of criminals. The tests included weight discrimination, extent of movement, color, vision, rate of tapping, speed and accuracy of movement, achievement capacity test, cancellation test, calculation test (counting backward by three from 31), uncontrolled association test, recognition memory test, ethical perception and ethical discrimination. One hundred subjects were tested, and on the basis of the results were ranked in an ascending scale of efficiency. The detailed clinical notes on the subjects were arranged in the same order, so that comparisons may be easily made. Comparison with the normal performance in each test shows that twenty-six of the subjects were decidedly defective, and another twenty-six were subnormal. Only forty-eight of the one hundred subjects could be called mentally normal. This is perhaps the most valuable psychological study of criminals that has yet been made.

ARNOLD L. AND BEATRICE CHANDLER GESELL. *The Normal Child and Primary Education*. Boston: Ginn & Co., 1912. Pp. x, 342. \$1.25.

A very desirable discussion, from the biological point of view, of some of the problems of elementary education. Parts I and II present the historical introduction and the genetic background, Part III outlines the pedagogy of the primary school as it ought to be rather than it is, and Part IV deals with the conservation of child life. A valuable appendix contains a trenchant criticism of the Montessori methods.

BERNARD HART AND C. SPEARMAN. *General Ability; Its Existence and Nature*. Reprinted from the *Journal of Psychology*, 5: March, 1912, 51-79.

Every intellectual performance depends on a "General Factor," and also in varying degree on a factor specific to itself and all very similar performances. Or, put physiologically, "every intellectual act appears to involve both the specific activity of a particular system of cortical neurons and also the general energy of the whole cortex." This general factor, in the belief of the authors, explains the correlation between different intellectual performances as to the nature and degree of which so much controversy has arisen in the recent literature of mental tests.

CHRISTIAN A. HERTER. *Biological Aspects of Human Problems*. New York: The Macmillan Company, 1911. Pp. xvi, 344. \$1.50 net.

More and more the biological point of view is pervading all departments of human thought. To an ever-increasing degree psychology, sociology, ethics, and even religion, are feeling its influence, while it is rapidly working a revolution in the whole scheme of educational procedure. As yet, however, the popular view of life problems, always conservative, has been but little affected by biological thinking. The present interesting and important volume considers some of the fundamental problems of human society in the light of the two great biological tendencies, self-preservation and the preservation of the species through the sex relationship. Some of the topics considered are health and disease, mental health, personality and the belief in immortality, the problem of the will, moral responsibility and education, marriage and divorce in relation to the family, art and religion, the position of women and the future of the race. The book is readable, makes a popular appeal, and should be read by every serious-minded student of human relations.

C. EDWARD JONES. *Sources of Interest in High School English*. New York: The American Book Co., 1912. Pp. 144. \$0.80.

A report on the results of a questionnaire sent to the high school teachers and pupils of seven cities, inquiring what reading was done during the past year, what was particularly liked in each case, and why. The 4000 results are tabulated by years of the high school course, by cities, and by sexes. Plot is the strongest element of interest in high school reading, with character and moral second. Style has slight influence (4 per cent.) in the first year, but rises steadily to 20 per cent. in the last. In a lesser degree the same is true of description. There is no evidence that girls' reading differs in quality from that of boys'.

J. D. LICKLEY. *The Nervous System. An Elementary Handbook of Its Anatomy and Psysiology for the Use of Students of Psychology and Neurology.* New York: Longmans, Green & Co., 1912. Pp. xii, 130. \$1.80 net.

In ten chapters the author discusses the animal cell, nerve cells and fibres, the general structure and development of the nervous system, the spinal cord, the hind-brain, mid-brain and fore-brain, the chief fibre systems of the cerebro-spinal axis, areas of localization in the cortex and the structure of the sense organs. The 118 illustrations and diagrams are large and clear, and many of them are printed in color, greatly facilitating the recognition of the parts. There is a good index.

E. B. LOWRY, M.D. *False Modesty.* Chicago: Forbes & Co., 1912. Pp. 110.

Publication in book form of eight magazine articles that aim to show fathers and mothers "the necessity of early and proper instruction for both boys and girls in matters pertaining to sex, and to prove that the parents who withhold this knowledge are committing a crime in allowing their children to fall because of ignorance." The excellence of Miss Lowry's other books on sex hygiene will insure a ready hearing for this little volume.

JAMES PHINNEY MUNROE. *New Demands in Education.* New York: Doubleday, Page & Co., 1912. Pp. x, 312. \$1.25 net.

The most important of these demands are (1) for small classes, so that the teacher may really know each one of her pupils; (2) greater consideration for the health of the child; (3) interesting and stimulating work in the schools; (4) the training of all the pupil's senses; (5) emphasis upon character; (6) preparation for effective living in the social community; (7) advisors for pupils after they leave school; (8) wide variety of educational opportunity after pupils leave school. While the book abounds in platitudes and gives little evidence of close thinking (its psychology is particularly archaic), the author is evidently in earnest, and his appeals point in the right direction.

WILLIAM STARR MYERS. *Country Schools for City Boys.* Bulletin 480. Washington: Bureau of Education, 1912. Pp. 22.

A description of the school life and work in several prominent private schools for boys.

OSSIP-LOURIÉ. *Le langage et la verbomanie.* Paris: F. Alcan, 1912. Pp. 275. 5 fr.

The author of this curious and typically French book considers talkativeness a psycho-social disease, and arraigns present domestic, educational and social practices as tending to spread the contagion

rather than to check it. He advocates accustoming children to be alone with their thoughts, and urges the organization of "leagues of silence," the object of which shall be to provide places of social meeting to counteract the present tendency to talk much and say little. The book contains many shrewd observations on the relation between thought and language.

WILHELM OSTWALD. *Monistische Sonntagspredigten*. Zweite Reihe. Leipzig: Akademische Verlagsgesellschaft, 1912. Pp. 209-416.

In this second series of Sunday sermons Ostwald considers such varied topics as freedom of the will, morals and science, the training of children, art, politics and language. Hereafter the sermons will appear in the new fortnightly organ of the German Monistic Society, *Das Monistische Jahrhundert*, published by E. Reinhardt, Jägerstr. 17, München.

G. E. PARTRIDGE. *The Genetic Philosophy of Education. An Epitome of the Published Writings of President G. Stanley Hall of Clark University*. New York: Sturgis & Walton Company, 1912. Pp. xvii, 401. \$1.50 net.

This simple, straightforward presentation of President Hall's views on educational questions, bearing as it does the stamp of President Hall's approval, will be warmly welcomed by students of education who desire to find out quickly and in brief compass the essence of those views without the inconvenience of searching through widely-scattered publications.

W. P. REAVES. *The Conservation of the Health, Teeth, Voice, Hearing and Sight*. Greensboro, N. C.: Privately printed for the author, 1912. Pp. 35.

Two lectures of the "popular" type, with illustrations from which slides may be prepared, and full directions for delivering the lectures, and suggestions for the detection of sensory defects by parents and teachers.

A Report on Vocational Training in Chicago and in Other Cities. Chicago: Published by the City Club of Chicago, 315 Plymouth Court, 1912. Pp. xiii, 315. \$1.50.

This excellent report presents one of the best surveys of the present status of vocational education that is obtainable. The needs and existing provisions for industrial and commercial training in Chicago are set forth and compared with those prevailing in twenty-nine other cities. Among the recommendations made are two-year elementary vocational schools, elementary industrial schools for over-age children below grade seven, trade schools for boys and girls, apprentice schools, co-operation with employers to secure day continuation

schools, legislation to raise the compulsory age limit, co-operative courses in the high school and industrial courses for girls in the high school.

J. ROGUES DE FURSAC, M.D. *Manual of Psychiatry*. Translated and edited by A. J. ROSANOFF, M.D. New York: John Wiley & Sons, 1911. Pp. xvi, 484. \$2.50 net.

Dr. Rosanoff translated the first edition of this well-known manual in 1905; the second edition in 1908. The present volume is a third edition from the third French edition. It gives the best statement in English of the classification of insanity developed by Kraepelin. The third edition adds a brief presentation of some of the newer views in psychiatry. Thus the author has added sections on disorders of writing, criteria of prognosis in dementia praecox, chronic mania and acute mental attacks in the feeble-minded, while the translator has added sections on the Binet-Simon scale, the influence of parental alcoholism, psycho-therapy, Mendelism and the inheritance of insanity, and numerous other topics. We recommend the book to those who desire a compact, authoritative and up-to-date survey of the field of insanity.

M. C. SCHUYTEN. *Korte Inleiding tot de Paedologie* (Brief Introduction to Paidology.) Antwerp: Victor Resselers, 1912. Pp. 25.

A chronological sketch of the development of paidological investigation from 1765 to 1910.

M. C. SCHUYTEN. *La Pédologie*. Gand: I. Vanderpoorten, 1911. Pp. 229.

The peculiar excellence of this book lies in the fullness of the bibliography and its arrangement. The subject is treated in ten sections, or books, each of which contains from one to twelve chapters. Each chapter is headed by a fairly complete bibliography of the topic, and the discussion is scarcely more than a brief comment upon the general trend of the literature. In all, 2882 publications are thus listed. The sections are entitled school hygiene, anthropometry, physiology, normal psychology, abnormal psychology, animal psychology, normal pedagogy, abnormal pedagogy, social problems, and anthropology and the history of the child.

ROMIETT STEVENS. *The Question As a Measure of Efficiency in Instruction. A Critical Study of Classroom Practice*. New York: Teachers College, Columbia University, 1912. Pp. 95.

Of all the means available to the teacher for stimulating and directing the activities of pupils, the most important is undoubtedly the question. It behooves each teacher, therefore, to devote careful study to the subject of questioning, to determine when to question,

how to question and what effect a given question will probably have upon the thinking of the pupil. Even the best teachers pay all too little attention to their questioning at present, and tend to swamp the thought of the class with questions. Out of one hundred random observations, twenty-eight showed between one hundred and two hundred questions asked by the teacher in a forty-minute period. Obviously, when questions come at the rate of three to five per minute, pupils have no time to think. Every teacher should read and ponder over the report of this investigation.

CALVIN THOMAS. *A Practical German Grammar*. Fourth Edition. New York: Henry Holt & Co. Pp. x, 485.

The book is divided into two parts, of which Part I is a beginners' manual, and Part II presents the details of formal grammar. The author believes that all learners should have grammar from the first. Great care has been taken in the selection of exercises, with a view to the development of a sensitive and trustworthy "feeling" for the language. A feature of Part I is the abundant use of English cognates in the vocabularies.

J. E. WALLACE WALLIN. *Experimental Oral Euthenics. An Attempt Objectively to Measure the Relation Between Community Mouth Hygiene and the Intellectual Efficiency and Educational Progress of Elementary School Children*. Reprinted from Dental Cosmos, April and May, 1912. Pp. 32.

One of the most important studies ever made in connection with the subject of dental hygiene.

J. E. WALLACE WALLIN. *Present Status of the Binet-Simon Graded Tests of Intelligence*. Reprinted from Alienist and Neurologist, 33: No. 2, May, 1912. Pp. 14.

On the basis of extended studies upon epileptics, the author is convinced that the Binet tests form a very serviceable measuring scale for the grading and classification of defectives. He expresses some doubt, however, whether the 1911 revision is an improvement over the 1908 form. One of the chief problems for future investigation is the establishment of normal norms of variation for the different ages.

JOHN H. WALSH. *Practical Methods in Arithmetic*. New York: D. C. Heath & Co., 1911. Pp. iv, 395. \$1.25.

Emphasis is laid upon drill in the art of manipulating numbers rather than upon explanations of the reasons underlying different processes.

WEBSTER WELLS AND WALTER W. HART. *First Year Algebra*. New York: D. C. Heath & Co., 1912. Pp. vi, 325. \$0.90.

E. C. WESSELHOEFT. *An Elementary German Grammar*. New York: D. C. Heath & Co., 1912. Pp. xvi, 272. \$0.90.

The chief aim of the author is to present the essentials of grammar as clearly and concisely as possible. The exercises are abundant and well chosen to afford drill on essentials, particularly the forms of the verb, and in them the simple style of every-day speech is preserved throughout.

WILLIAM CECIL DAMPIER WHETHAM AND CATHERINE DURNING WHETHAM. *Heredity and Society*. New York: Longmans, Green & Co., 1912. Pp. viii, 190. \$2 net.

By the authors of *The Family and the Nation*, and written with a similar purpose—to draw attention to the problem of heredity and its relation to sociology. The fundamental thesis is the one that Pearson and many other writers are defending so emphatically, that better educational facilities and better environmental conditions in general will not suffice to advance the fundamental traits and qualities of a nation. Selection is essential for this. The volume, therefore, adds one more to the increasing number of treatises on eugenics.

ARTHUR WRESCHNER. *Die Sprache des Kindes*. Zürich: Orell Füssli, 1912. Pp. 43. 80 Pf.

A compact discussion of the development of linguistic activities in the child. The reciprocal influence upon each other of language and thought, the chief stages of word and sentence building and the gradual crystallization of meaning are salient features of the monograph.

ARTHUR WRESCHNER. *Vergleichende Psychologie der Geschlechter*. Zürich: Orell Füssli, 1912. Pp. 40. 80 Pf.

A survey of sex differences in sensitivity, discrimination, speed and accuracy of movement, various aspects of memory and association, character of imagery, verbal expression, the psychology of report and a discussion of the bearing of these on co-education.

EMILY DUDLEY WRIGHT. *The Psychology of Christ*. New York: Cochrane Publishing Co., 1909. Pp. 106.

A quasi-mystic, sentimental and religious discussion by a Froebelian of will, conscience, wisdom, soul, spirit and similar topics. The reader might get some religious inspiration, but would find it difficult to detect any modern psychology.

EMILY DUDLEY WRIGHT. *The Child in Our Midst*. New York: Cochrane Publishing Co., 1909. Pp. 22.

A booklet similar in type to the author's *Psychology of Christ*.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

THE CHILD'S SPEECH.

I. THE IMPULSE TO SPEECH.

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1. The incentives which lead to the rise of speech are many and complex. Some have their origin in the world about the child; some spring from the new forces which are growing up within his own nature. He meets the demands which the world makes more than half-way. Without urging, the function would still manifest itself as a spontaneous activity reflecting the result of changes taking place in his internal constitution. Articulate expression becomes an insistent need at a certain stage of his development; he craves it as a relief, for he is burdened with thought. It was the pressure of this need which led to the original invention of speech by man, and every child experiences the craving for expression anew in his own life.

The rise of this need is a correlative of the child's growing power and the new situations in which he finds himself as a result of the extension and complication of his activities. Sense organs and muscular system have begun to serve him by controlled and co-ordinated processes. He can look and listen, reach and handle. His alert senses are turned, with ever-increasing interest, upon the variegated world about him, and his busy hands are engaged in an incessant investigation of its objects. He moves with more and more freedom, while every increase in the range of his excursions brings him into contact with things hitherto unknown, and plunges him into fresh perplexities and new dangers.

This widening horizon stimulates the child keenly. He feels new tendencies to action, and strange emotions move him. Timidity and daring clash within his nature; curiosity draws him on and fear withholds him. He is growing rapidly, and great modifications in his own organization are taking place. Inherited impulses awake as maturation proceeds in nervous and other mechanisms. Among this system of developmental changes appear the complex modifications upon which the rise of speech depends. These affect the child's own nature, as well as the world in which he finds himself, and this division affords the most convenient grouping under which they may be considered.

2. The first is the inherited system of factors. It has a double aspect, involving both structural and functional development. Organic growth affords the necessary basis for articulation and understanding alike. The nervous organization must have advanced to such a degree as to make correlation possible among the materials of sense perception, for to use speech means to connect impressions of eye and ear with the remembrance of their characteristic associates and so to understand the significant relations which make experience intelligible. It requires also that each impression, or the representation of it, shall suffice to arouse the thought of the particular verbal symbol by which in human speech it is indicated. A process of functional correlation within the nervous system, an advance—even in organization—inconceivable in its complexity, must have taken place in the brain of the newborn child before such an activity as speech can become possible. The product of the whole inherited momentum of growth which marks the first months of infancy goes to the preparation of the child for this new function of expression.

Organic development marks peripheral as well as central mechanisms. The child is born with defective organs of speech as well as an unco-ordinated brain, and the first year of life sees the mouth as well as the central nervous system taking shape. Maturation in general is accompanied by a craving for functional activity. In this special case it issues not only in the characteristic biting and chewing of the young child, but also in the use of the new powers of muscular co-ordination in

speech. In the sense, therefore, that it is correlated with a particular phase of organic development which not only makes its appearance possible, but of which it is a spontaneous product, the articulate utterance of the child may be said to be due to an inherited impulse.

3. In certain other ways also the student of speech development must have regard to the factor of heredity, for in every individual a system of congenital mental predispositions exists which plays an important part in calling it forth. These specific tendencies to reaction are commonly called the expressive and social instincts. They represent the functional aspect of development in its ecological relations.

Among these factors the most generalized type is that tendency toward the objectification of mental states through forms of muscular activity which has been called the expressive instinct. The inquiring and creative spirit of the child, thrilled by its new experiences, treats the world from the outset both as an object for speculative and practical research and as plastic material for the realization of its own ideal aims. The latter is embodied in the modification of objects and their relations—in creative construction through all its types; the former, while manifested through muscular excitement at large, depends increasingly upon the musculature of speech in the case of the human child, and out of this habit arises, by a continuous process of substitution, the expression of mental states through the use of a system of verbal concepts.

Some ideal conceptions can best—or only—be expressed through manual constructive activities, but others, which are expressive as opposed to creative in the narrower sense of the term, need a more refined and analytic medium than these gross materials afford. Plastic expression approaches nearest to this desideratum in music, the most expressive of the arts, whose technical medium is the vehicle of speech itself. Thus, considered even in its most general sense, the instinct for self-expression has issued in a system of sounds depending upon the vocal organs for their production. In speech this craving has taken its last step toward ideal development and created a system of materials by which the most subtle differences of attitude and meaning may be indicated.

4. In the development of this medium for his own individual expression the child is furthered by a second and more specific form of mental predisposition—that, namely, to imitate the sounds he hears, and especially the sounds of the human voice. For the production of these sounds a structural basis is afforded by the organic development already described. The general imitative capacity, however, receives more specific direction through the peculiar association of the human voice with the whole course of the child's experience. The later imitation of the sounds of speech is deliberate and ideal, but its earliest manifestations are the product of an inherited tendency to respond reflexly to this particular stimulus. Though this imitative activity cannot be called a phase of speech proper, it plays an important part in the development of articulation, as will be pointed out later in this series of papers.

5. With these first and most general predispositions must be mentioned another which connects the child in a more special way with his fellows and their reactions. To this the name social instinct has been given; it is the craving for sympathy and appreciation universally manifested by children, the full development of which is made possible only through the possession of speech. The child not only rearranges things in ways determined by his own preferences and expresses his momentary attitudes and feelings by voice and gesture; he also directs this expression more and more toward a receptive and reciprocating audience. This enduring tendency appeals, of course, to beings of one's own kind, to creatures who can understand and appreciate one's experience. The individual turns first, then, to his immediate fellows for sympathy and support, but if he lack such an audience he has recourse, if he be a child, to his toys and the family pets, or, if he be an adult, to posterity, to all nature (which he conceives as animate and intelligent), or to eternal justice and a divine pity as embodied in an infinite mind.

This need of social support develops with great rapidity in the child, and he soon becomes imperious in his demands. Every activity must be shared, every achievement exhibited and approved, every suffering consoled. It might even be said

that every judgment must be socially ratified before the child attains full confidence in it. The general means by which such intimate social community is made possible is found in the voice, and its special instrument consists in the system of verbal concepts which constitutes a language. Back of the development of speech in every child lies the urging of this great instinct to seek and to offer fellowship.

6. The service of reflex imitation in the development of articulate utterance is supplemented by another type of spontaneous activity possessing a hereditary basis. This is the child's tendency to repeat and vary the sounds he hears in an experimental way and for his own entertainment. To this way of treating the materials of experience at large the name of play has been given. Among the varieties of this material none is more plastic than the tones of the human voice, and the child begins his use of them in this manner long before he has acquired a proper speech—indeed, before he is able to deal successfully with any other such general medium for his own amusement. The practice which the voice receives in this way is incessant, and it serves largely in developing the full range of articulate sounds and facilitates their production. The child's earliest processes of learning arise through unstimulated play, and in the mastery of the forms of speech none can realize how large a part it plays who has not closely studied the young child's use of the voice when he is thrown upon his own resources for entertainment.

7. Such factors as these, reflecting the process of inner development in the child's own nature, co-operate in arousing and sustaining the activity of speech. But he is not simply drawn forward in the process by the current of his own mental growth; he receives positive impulses in the same direction from the external world and the demands made upon him by the many practical problems which confront him. The mastery of speech is made necessary as a condition of successful adaptation to his social environment, and thus indirectly to the surrounding world as a whole.

To be able to speak brings enormous practical advantages in addition to those esthetic satisfactions already mentioned. For the clarification of his own meaning and its permanent

record the child is later to find language indispensable, but its incidence first falls upon the function of making his wants known to others and in securing their mediation in the attainment of his various practical ends. The lack or deprivation of this power is a specific disability which entails the gravest consequences, and whatever difficulties a defective introspection may interpose, there is no mother who has not felt the inexpressible relief which comes when the child is able to understand and to answer her questions.

8. In the way of general supplementation and control of the conditions underlying the child's speech development, and for the purpose of hastening his acquisition of the faculty, it follows that he should be made to feel as fully as possible the rewards of success in speaking (or reading, or writing, as the case may be). This is accomplished in two general ways—first, by profit; for example, in getting the thing he asks for; and, secondly, by praise of his effort, which makes the experience of mastery desirable for the immediate satisfaction it affords. It follows also that the child should be brought to feel the consequences of disability in the same direct and incisive way—for example, by refusing to attend or gratify his desire if it be indicated by a gesture or an inarticulate cry when he is of an age to acquire the verbal symbol or has already made attempts to use it.

A premium is thus put upon the child's capacity at each stage of its progress. From the point of view of method it is unwise to anticipate the child's wants and interpret his most rudimentary expressions. The motive for acquiring the new function is taken away if he do not feel the need of it as a means to his own satisfaction. When the child sees that his happiness is dependent upon the possession of speech, he will quickly set himself to acquire it.

9. On the other hand, the teacher should be no less careful to let the child see that he is understood and appreciated when he speaks. He seeks recognition in word and look when he thus utters his mind, and may be seriously discouraged if it be found lacking. The adult knows how readily his own speech and thought are disturbed by an inattentive or unresponsive hearer, and can appreciate how important an element sympa-

thetic response must be in the process of acquiring speech. It is the sweetest part of the child's experience to feel that he has been understood and appreciated. His world grows at once larger and brighter. He has uttered his thought, which is itself a clarifying and educative process; he has had the immediate and inexplicable delight of sharing his experience; and he has had the sympathetic approval of a larger self, which his still insecure footing in the new world he is to master often requires as a ratification of his own thought's worth. For the child learns early that there is a struggle for survival among the many aspects under which experience may be viewed and the many thoughts about the world which arise in his mind. He is largely guided in his selection and appropriation of these—in his distinguishing of truth and error, right and wrong, etc.—by the approval or disapproval of his elders. To have used words successfully, to have expressed himself by means of an accepted social medium, is itself to have made an advance in this process of sifting, arranging and describing his world, which as much deserves recognition and praise as do his later truth-telling and unselfishness themselves. Unhappily, we are most familiar with the child's response to praise in those cases where a trivial quaintness or even a picturesque vulgarity in speech has occasioned remark or provoked an amused smile. We then find that he meets our interest by an instant repetition of the word or phrase accompanied by the most evident expressions of pride and delight. To the initial vivacity of impression in such an experience persistent idiosyncracies of child speech may in all probability owe their origin. His elders, however, often fail to recognize how generally important such attention and appreciation are to the child's progress in the use of language.

(To be continued.)

GRADED MENTAL TESTS.

PART II. ASSOCIATION, CONSTRUCTION AND INVENTION.

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Chicago, Illinois.

5. *Association:*

A. *Efficiency of old associations.* It seemed desirable to find a test that would measure in terms of age the efficiency of associative connections already established. After canvassing the available tests of controlled association, the lists of opposites used by Bonser¹ seemed most suitable. This includes Series I of Norsworthy's test.² The advantage of these three series is that they, as well as their opposites, are all well within the youngest child's vocabulary. The list is as follows: Series I—day, asleep, absent, brother, best, above, big, backwards, buy, come, cheap, broad, dead, land, country, tall, son, here, less, mine. Series II—great, hot, dirty, heavy, late, first, left, morning, much, near, north, open, round, sharp, east, known, something, stay, nowhere, past. Series III—bad, inside, slow, short, little, soft, black, dark, sad, true, dislike, poor, well, sorry, thick, full, peace, few, below, enemy. My method was determined by the abilities of the youngest group. The experimenter gave the stimulus word and recorded the association and the reaction time. The results for different grades are more comparable than they would have been had the stimulus

¹F. G. BONSER. *The Reasoning Ability of Children of the Fourth, Fifth and Sixth School Grades.* Contributions to Education, Columbia University, No. 37, 1910, p. 5.

²NAOMI NORSWORTHY. *The Psychology of Mentally Deficient Children.* Archives of Psychology, No. 1, 1906, p. 24.

been presented visually and the pupils recorded their own association. In that case the time for making a record would vary greatly from group to group, but by this method the time taken for recording is a constant factor, and may be disregarded.

With each pupil we made sure before proceeding with the test that the meaning of "opposite" was clearly understood. The younger pupils were given some practice in naming opposites before they began Series I. In the tabulation of results we have counted as errors all responses that were not accurate. If the stimulus word was an adjective, we did not give credit for the adverbial form of the opposite or for a word approximating the opposite. There is no mental test in which an approximation is less permissible. One of the tests of efficiency in life is ability to make exactly the correct association; in other words, to react to each situation in a strictly appropriate manner.

TABLE VIII.
Association of Opposites.
Unretarded.

Group Age.	Series I (20 words).			Series II (20 words).			Series III (20 words).			Average for All Series.	
	Av. No. Words.	M. V.	Time. (Sec.)	Av. No. Words.	M. V.	Time. (Sec.)	Av. No. Words.	M. V.	Time. (Sec.)	Correct.	Time. (Sec.)
6	8.5	2.4	192.3	11.3	2.1	143.3	11.6	2.5	120.0	10.5	151.8
7	13.1	2.7	155.6	15.0	2.2	137.7	14.5	1.2	117.6	14.2	136.9
8	16.1	1.3	110.3	17.1	1.4	98.2	16.7	1.7	104.9	16.6	104.8
9	17.6	1.2	103.7	16.5	0.87	101.1	17.7	0.82	98.4	17.2	101.7
10	17.1	0.3	87.1	17.7	1.0	87.0	18.2	1.1	76.2	17.6	83.4
11	19.3	0.4	79.3	19.0	0.6	102.0	19.6	0.4	68.3	19.3	83.2
12	19.5	0.5	81.2	19.2	0.3	85.5	19.2	0.3	63.2	19.3	63.2
13	19.4	0.4	72.5	19.2	0.6	61.5	19.2	0.9	65.0	19.3	66.3

The correlation between this test and age is clear, but not marked by large differences. Maximal efficiency seems attainable at the eleventh year.

TABLE IX.
Association of Opposites.
Retarded.

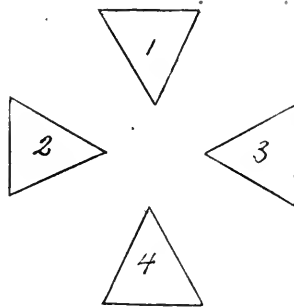
Group Age.	Series I (20 words).			Series II (20 words).			Series III (20 words).		
	Av. No. Words.	M. V.	Time. (Sec.)	Av. No. Words.	M. V.	Time. (Sec.)	Av. No. Words.	M. V.	Time. (Sec.)
8	12.0	1.0	174.5	10.5	2.0	177.5	11.6	0.5	127.5
9	16.6	1.2	192.3	17.3	0.4	104.3	18.6	1.2	76.3
10	2.0	..	277.	7.	..	156.0	..	..	..
11	17.6	0.7	101.	17.	0.8	107.2	17.4	..	102.6
12	18.5	1.2	104.5	17.5	1.5	103.5	18.2	1.5	84.5
13	19.0	0.6	77.3	19.5	0.8	76.0	20.0	0.0	57.6

The record of the retarded group has been given in detail (Table IX) for the sake of comparison. Here, as in other tests, the results for the retarded are more irregular, and exhibit a distinctly lower general average of achievement than those for the unretarded. This test brings out the clearly sub-normal condition of the one retarded child in Group 10. It was impossible to give her Series III during the time we had for the test. This child needs, and is receiving, special study.

B. Learning (formation of new associations). In these tests we have limited the term learning to the establishment of associations definitely set forth, and have neglected the higher type shown in ability to form new combinations of one's own initiative. The emphasis of the school is upon the set task.

The typical learning test, as Dr. Dearborn has pointed out,² is out of the question where tests must be confined to a limited time. The 'substitution test' which he has used, and the simpler ones devised by the Chicago Department of Child-Study are far more practical for clinical purposes. I found that the substitution test used by Dearborn was too difficult for the grades, though it might perhaps be used with the older groups. Instead, I used two simpler forms.

(a) *Maltese cross test:* The dissected Maltese cross was shown with the numerals 1, 2, 3 and 4 placed as indicated in

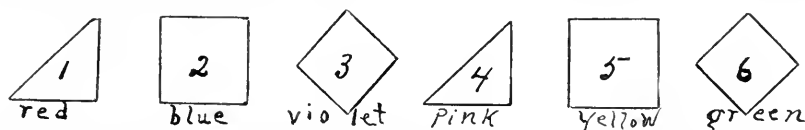


the figure. Below this figure the four parts were arranged in rows of four, distributed in varying orders. The whole figure was exposed for a brief period and attention directed to the numerals in the four parts of the cross. The figure was then

²W. F. DEARBORN. *Experiments in Learning*. This JOURNAL, 1: 1910, 374.

covered and the child asked to place the appropriate numerals in the dissected parts below. In case of failure to make the correct associations, his attention was again directed to the figure at the top of the page, which was again covered while an attempt was made to place the correct numerals in the distributed parts on the second row. This procedure was repeated until the correct associations had been established. The number of repetitions necessary to establish the correct associations was taken as a measure of ability to learn.

(b) *Colored forms test*: The second test was of similar nature, but complicated by the color factor. Six forms, two right triangles of different color, two squares of different color and two diamonds of different color were associated with the numerals 1, 2, 3, 4, 5 and 6. It was thought that by the use of two triangles, two squares and two diamonds in six different colors confusion might easily arise and the difficulty of establishing a correct association be thereby increased. The forms



in the arrangement here indicated were placed at the top of the paper. Below were placed rows of the six-colored forms, but without the numerals. The order of the forms was different in each row. The method of procedure was that described for the first learning test, and the number of repetitions required to establish the given association was again taken as the measure of facility in learning. These should have been supplied

TABLE X.

Group	Learning: Maltese Cross Test				Learning: Colored Forms Test.			
	Unretarded.		Retarded.		Unretarded.		Retarded.	
Age.	A. No.	Cases Com- plete Failure.	A. No.	Cases Com- plete Failure.	A. No.	Cases Com- plete Failure.	A. No.	Cases Com- plete Failure.
7	1.2	1	1.5	1	1.2	1	1.2	1
8	2.5	1	1.5	1	1.2	1	1.2	1
9	1.8	1	1.6	1	1.4	1	1.7	1
10	1.4	1	1.8	1	1.5	1	1.8	1
11	1.3	1	1.8	1	1.3	1	1.8	1
12	1.0	1	1.3	1	1.4	1	1.3	1
13	1.2	1	1.3	1	1.2	1	1.0	1

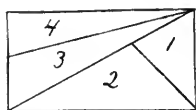
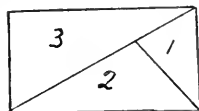
mented by a third and more difficult set, which would emphasize the correspondence between ability to learn and age.

One of the anomalies of the learning test which surprised me at the time the tests were given and which is revealed to a certain extent in the tables is the excellent records often made by retarded children (note especially the case of the retarded child in the ten-year group, who was distinctly subnormal). The obvious explanation is that through the discipline of the school these children of weaker native ability have learned to direct their best efforts upon whatever is to be learned. They have gained skill in attacking the set task, and are thereby able to cope with their better endowed mates in a school environment, or one that resembles it.

6. *Invention and Construction (problem tests.)*

The next series is comprised of what one might term "problem tests." This term seems to fit the essential characteristics of the tests, which were planned to measure ability to use the elements of previous experience in new combinations for the solution of specific problems. They may also be called tests of constructive ability. Two types of problem test were given: (1) mechanical; (2) linguistic.

A. The mechanical. Test No. 12 of the Binet-Simon 1908 series was made the basis of three rectangular puzzles. (a) For the first problem we employed the divided rectangle just as it was used by Binet and Simon. The child is given an undivided rectangle and a rectangle divided along its diagonal. The divided rectangle is so placed that its normal position is not suggested. The child is then asked to put the two pieces together so that they will look like the first figure—the undivided rectangle. (b) For the second problem the rectangle was divided into three parts. These parts were given to the child, and he was again asked to put them together so that they would resemble the undivided rectangle. (c) A rectangle of the same size, but divided into four



parts, was next given. The problem was similar to the preceding. We gave the series in the above order of graded difficulty for the purpose of determining whether the experiences gained in the solution of the first or of the first and the

second would be consciously applied in the solution of the third. While there may have been some gain in ability to solve the third through the successful experiences with the first and second, there were only two of the eighty children tested who saw the relation of the three figures to each other—one was a ten-year-old and the other a twelve-year-old girl. Both of these children were slow to react, but inclined to figure each step out before they made it. Triangles (1) and (2) of the third puzzle are of exactly the same size and shape as (1) and (2) of puzzle two, yet all of the children tested fitted and tried these triangles as though they had not just seen similar forms.

TABLE XI.
Rectangle Puzzles.
Unretarded.

Group Age.	First Puzzle.		Second Puzzle.		Third Puzzle.	
	Av. Time. Sec.	M. V.	Av. Time. Sec.	M. V.	Av. Time. Sec.	M. V.
6	{ 37.6* 18.4*	{ 27.8 17.5	70.7†	35.8	173.0‡	122.5
7	13.3	3.2	65.7	29.6	175.9	75.2
8	6.6	4.6	90.5	42.0	185.0	95.7
9	2.9	1.9	41.1	27.3	145.6	79.2
10	2.1	1.1	89.3	34.1	112.3	59.9
11	1.0	0.0	51.0	9.3	128.0	72.0
12	1.0	0.0	25.4	14.2	66.7	27.0
13	1.0	0.0	33.6	24.8	47.1	42.0

Retarded.

Group Age.	First Puzzle.		Second Puzzle.		Third Puzzle.	
	Av. Time. Sec.	M. V.	Av. Time. Sec.	M. V.	Av. Time. Sec.	M. V.
8	4.0	4.0	65.0	....	Both failed.	
9	18.0	22.0	90.0	60	102.3	61.7
10	7.0	....	98.0	....	316.0	....
11	6.3	2.9	45.2	16.2	206.0	62.0
12	1.0	0.0	50.4	30.1	65.6	13.9
13	7.1	4.8	25.5	1.0	103.5	103.5

*A train of associations was set up in the case of one six year old child that so lengthened her time as to unduly lengthen time for whole group. If her record is eliminated the average for the remaining nine in the group is shown in the second set of figures.

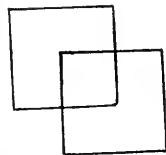
†One child failed.

‡Two failed.

The results from the first puzzle suggest the three stages of development noted in other tables, but the results as they

stand do not give unequivocal norms. The general irregularity and the high mean variation indicate that with this type of test the time factor does not afford the best measure of efficiency, although the puzzle-problem itself affords excellent criteria for judging of mental capacity. The differential in this test should be method of attack rather than time consumed in solution, or at least the time factor should merely be used as a supplementary measure. There were great differences in the readiness with which the problems were attacked; some children hesitated, thinking the difficulties were greater than they were; others mentally constructed each step before making the actual moves; in other cases association by similarity worked disadvantageously. Ruger's statement⁴ was true of these children: "In general, the solutions were not the result of mere straight away thinking and the consequent formulation of a thorough-going plan of action, but were the outcome of an extremely complex interrelation of more or less random impulses and ideas." In the accidental solutions there was always some awareness of the relation of pieces just before the last piece was put in place. Ruger's observations again tally so fully with ours that we quote from him (p. 9): "Behavior of human subjects showed many of the features usually accredited to the behavior of animals in contrast with the human being. Acts which made no change in the situation whatever were at times repeated indefinitely and without modification. In practically all of the cases random manipulation played some part, and in many of the cases a very considerable part in the gaining of success."

A second set of mechanical puzzles was given. The first of these is Problem 8, used by Terman⁵. The problem is to trace the following figure without crossing a line, lifting a pencil or tracing any part twice. This calls for an initial formulation of the problem for successful solution, and practically rules out random movements.

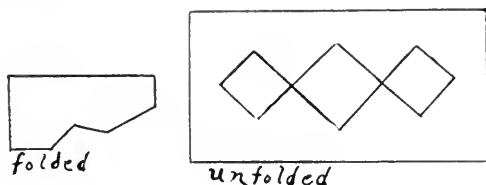


The second test in this set was No. 29 of the Binet-Simon 1905 series. A design is cut in a quarto-folded

⁴H. A. RUGER. *The Psychology of Efficiency*. Columbia Contributions to Philosophy and Psychology, 19, 1910, No. 2, p. 21.

⁵L. M. TERMAN. *Genius and Stupidity*. Pedag. Seminary, 13, 1906, 330.

paper and child asked to draw what he would see if the paper were unfolded. This necessitates visualization and the construction of the whole figure from a part, if problem is successfully solved.



The third test was No. 28 of the Binet-Simon 1905 series. It is called the interchange of the clock-hands. The child is asked the following question: "Suppose it is four minutes of three, can you see in your mind where the large hand would be and where the small hand would be?" "Now, suppose the large hand takes the place where you say the small hand is and the small hand takes the place of the large hand, then what time would it be?" Hands are also mentally interchanged for twenty minutes past six. To solve this problem the primary requisite is, of course, a fair degree of facility in telling time. In addition, there is required ability to reconstruct the clock face visually and to translate these visual images into terms of another visual image and, thirdly, to translate this second visual image into terms of time. There were two distinct types of successful solution of the clock-face problem: The younger children always separated the problem into its two steps; the children of the twelfth and thirteenth year groups were most of them able to interchange the hands at once without the use of an intermediate step.

In the case of the Terman puzzle, there was not a single instance of failure to grasp the situation—"see the trick," as one child expressed it—beyond the eighth year. This shows the Terman problem to be an excellent initial test in a graded

TABLE XII.

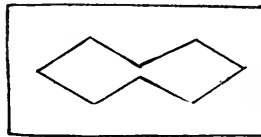
*Mechanical Puzzles—Second Set.**Unretarded.*

Group Age.	Terman.	Binet (cut design).		A		B	
	Complete Success.	Complete Success.	Partial Success.	Complete Success.	Partial Success.	Complete Success.	Partial Success.
6	1	..	..	..	..	..	..
7	7	0	2	2	0	2	0
8	5	2	2	5	2	7	1
9	8	2	4	4	2	5	1
10	9	2	5	6	2	6	2
11	5	3	0	5	..	5	..
12	8	2	4	5	..	5	..
13	7	3	3	7	..	7	..

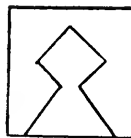
Retarded.

8	0	0	0	0	0	0	0
9	2	1	1	0	1	0	1
10	1	0	0	0	1	0	0
11	5	2	0	1	1	4	..
12	4	..	4	4	..	3	..
13	3	1	1	2	..	2	..

Not even the oldest group succeeded in making a perfect average for the solution of the problem in quarto-fold design. This problem can be correctly solved only by strong visualizers. A common drawing was of this form:

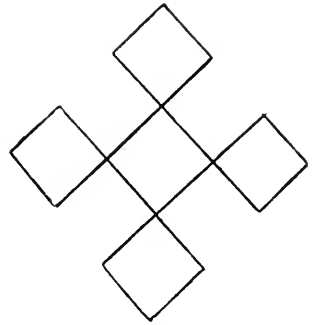


An earlier form was the result of visualizing but one-half of the problem; it was this shape:



Among the oldest groups the original figure was frequently elaborated in this fashion:

This tendency to elaboration was doubtless due to the influence of school work in design. This test depends altogether too much upon mental type to make it an accurate measure of general mental ability. The three well-defined stages of success noted previously are well brought out in the clock-face test: Children in the sixth and seventh



years almost invariably failed; the children of the eighth, ninth and tenth years achieved a fair measure of success; those of the twelfth and thirteenth years not only succeeded, but almost always reached the solution in one step.

B. Linguistic Invention: Three tests were made of linguistic invention. The first of these was a modification of No. 26 in the Binet-Simon series of 1905. Children were asked to make sentences containing the three words, *boy*, *river* and *ball*. We substituted *boy* for *girl*, used in the Binet test. Since the ball is, and always has been, the boy's plaything rather than the girl's, experience and associations make this combination of three words more suggestive than that used by Binet.

We also increased the possibilities of the test by one more step, which was suggested by our experience with the six-year group. In presenting the test to these children we used not the unfamiliar word "sentence," but the familiar word "story." We asked for a story about a boy, a river and a ball. The child's fancy did not always stop within the bounds of one sentence, but carried the narrative to completion. We decided at once to modify the test by asking for the story or narrative from all of the groups. In the sixth, seventh and eighth years the story was given orally and taken down by the experimenter just as given by the child. From the ninth year on the children wrote their own stories. This explains the comparative brevity of those given from that time on. In order to illustrate the development of linguistic invention as shown by this test even better than it can be illustrated by

tabulated results, I give herewith a typical story from each group. The choice was difficult, for there were often several of almost equal excellence.

6th year. "Once upon a time there was a little boy and he had a ball and he went down by the river. The boy dropped his ball in the river and then he began to cry and a bird flew by and said: "Why do you cry little boy?" and then he said: 'Don't cry, I will get the ball out of the river for you.'" and the bird tried and tried and he couldn't get it out and a swan came by and said, "Don't cry little boy, I will get the ball out for you." So he got it out.

7th year. "A boy was playing with a ball by the river and the ball rolled in and he sat by the river and cried. A policeman came by and asked, 'Why are you crying?' and he said, 'My ball has rolled in the river and I can't get it out.' Policeman said, 'I'll go to the farm over there and get a rake' and he got it and the little boy began playing with the ball and it got to rolling and he couldn't get it."

8th year. "A boy threw his ball in the river. The boy wanted to get his ball out of the river. The river didn't want him to get his ball. The boy began crying because he wanted his ball and could not get it. The river laughed at him and said it wanted the ball. The boy had to go and buy a new ball, because he could not get his ball out of the river."

9th year. "Once upon a time a boy took his ball and went to the river. The boy threw his ball up and when it came down it fell in the river."

10th year. This boy tells of an actual experience, which was also drawn upon by one of the 11-year old children. "Once upon a time there was a fifth Grade base-ball team they played the third grade team out in flosmore the catcher had to catch by a river and every time the boy missed the ball it went into the River."

11th year. "Once a boy bought a new base-ball he was playing by the river with his new ball in his pocket all of a sudden his ball rolled into the river with a cry the boy dashed into the river and began to swim out in the direction that he had seen his ball go down into the water. At last he got it and he swam to the shore again and went home dripping wet." Except for the complete disregard of sentence form, this shows a considerable advance over the previous narratives.

12th year. There were several excellent inventions in the 12th year, but the following was the most original in form.

"There was a boy who had a ball,
and lost it in the river,
The boy found his ball when he grew tall
a floating in the river."

13th year. The following illustrates better than some of the longer narratives the control of sentence structure which has been acquired. "As a little boy was running down a hill, he saw a big red ball on the road side and thinking it would be a nice present for his little sister whose birthday came the next day he picked it up and walked home along the beautiful river bank."

The children seemed to enjoy this test, and as a rule had thought out their story and completed it in less time than they

required for the average test. We note, in looking over these stories, a development from the crude sentence strung together by "ands" to a closely-knit sentence. Another characteristic change is the transition from the fantastical type of story related by the six, seven and eight year old children to the extremely realistic, matter-of-fact style employed by the ninth, tenth and eleventh year groups. Another plane of invention, more flexible in style, is evident in the stories of the twelfth and thirteenth-year groups. After the eighth year there was not the slightest difficulty experienced by any of the children—if we except the cases of the retarded ones—in weaving a complete narrative about the three words.

TABLE XIII.

Narratives based on the words, boy, river, ball.

Group. Age.	<i>Unretarded.</i>				<i>Retarded.</i>			
	12 Failure.	12 Separate Sentence for Each Word.	Three Words in one Sentence, Sentences Unconnected.	Complete Narrative.	12 Separate Sentence for Each Word.	Three Words in one Sentence, Sentences Unconnected.	Complete Narrative.	
6			3	3	..	..	..
7	1		3	4	..	..	..
8	..	..	2	6	1	1	..
9			1	6	..	..	3
10				9	1	..	..
11				5			5	
12				6		1	3	
13				7			3	

Three children, two of the sixth-year group and one from the seventh-year group, failed in this test. The results (Table XIII) are subsumed under three heads: those cases in which separate sentences were made for each word, those cases in which the three words were easily woven into a sentence, but the sentences left unconnected, and the larger group, which achieved a complete narrative about a theme suggested by the three words. All of the children beyond the seventh year were able at least to build one sentence containing the three words, excepting one of the retarded children in the eighth year and the badly retarded child in the tenth year.

My second test of linguistic invention, the word-building

test, gave, on the whole, less satisfactory results. The list used contained the letters a, e, o, b, m, t. We followed the usual method in every respect.⁶ The time limit was five minutes, though with the younger children this time was much longer than was needed, because the possibilities of their vocabularies were frequently exhausted in two minutes. None of the children seemed familiar with the game of anagrams; neither did they apparently call to their assistance the phonetic word-building exercises so frequently used in our schools.

TABLE XIV.

Word-building.

Group Age.	Complete Failure.	<i>Unretarded.</i>			<i>Retarded.</i>			Complete Failure.	Av. No. Words.	Max.	Min.	M. V.
		Av. No. Words.	Max.	Min.								
6	..	..	..	..	..	..	..	..	..	..	..	..
7	1	5.5	10	4	12.5	..	..	..	..	..	..	..
8	1	10.8	14	5	2.7	1	..	4	4	0	1	1
9	1	8.8	14	5	3.4	..	..	5	7	3	3	1.3
10	..	10.5	17	8	1.9	..	..	3	3	3	3	0.
11	..	7.	8	6	.6	..	..	6.8	12	5	5	2.1
12	..	13.8	17	11	12	..	..	7.6	10	3	3	3.1
13	..	11.8	17	9	2.8	..	..	8.6	14	3	3	3.8

The correlation in this case between efficiency and maturity is not so complete as in many of the other tests. Perhaps if all the children had received practice in similar exercises the results would have been more regular, but such practice would have been completely out of harmony with the general plan of the tests.

The third test of linguistic invention was the one familiarly known as the Ebbinghaus Completion Method. As used in these experiments it seems to provide a fair measure of the child's ability to imaginatively reconstruct and interpret the whole when a few of the elements are given.

It was first necessary to choose a selection which could be appreciated by the youngest group and would at the same time seem worth reading by the oldest. The elisions must not mutilate the text so that an adult would have difficulty in un-

⁶G. M. WHIPPLE. *Manual of Mental and Physical Tests*, 1910, p. 441.

tangling the meaning, nor on the other hand be so few that the thought would be obvious at a glance. The text we selected was: "*Where the Dandelions Went*," with the same elisions as given in Whipple's *Manual*, p. 448. The story was not read; neither was it told to the children, but the text was placed before them with the prefatory remark that they would find there a story of a little boy and his mother, and that if they completed the story by filling in the missing words they would be able to tell what became of the dandelions. This test was not given to the sixth or seventh year group. Four in the eight-year group tried it, but the remainder found it too difficult. Three of the nine-year group, and also the retarded child in the tenth-year group, failed completely. All of the others attained a fair degree of success.

TABLE XV.

Completion Test.

Group Age.	<i>Unretarded.</i>				<i>Retarded.</i>			
	Av. No. Errors.	Max. No. Errors.	Min. No. Errors.	M. V.	Av. No. Errors.	Max. No. Errors.	Min. No. Errors.	M. V.
8	29	56	17	13.5				
9	23.8	34	17	6.5	20	20	20	0
10	15.	30	6	4.6	..	..	..	..
11	5.6	9	3	2.	21.2	34	9	6.2
12	5.7	11	1	4.2	10.6	13	6	2.7
13	6.6	12	3	2.7	12.6	20	7	4.4

There is the same manifest gain in power by the senior groups that was noted in other tests. The break here seems to come between the tenth and eleventh years rather than between the eleventh and twelfth.

(Concluded in the November number.)

A COMPARISON OF THE BINET TESTS OF 1908 AND 1911.¹

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The extensive use of the Binet tests of intelligence published in 1908² has brought to light certain defects in this measuring scale. To correct these defects Professor Binet published in 1911³ a revision of the 1908 series of tests. The tests as revised are given below:

THE 1911 BINET TESTS OF INTELLIGENCE.

1908. III.

1. Points to nose, eyes, mouth.
2. Repeats two numbers.
3. Describes pictures.
4. Knows family name.
5. Repeats sentences of six syllables.

IV.

1. Knows sex.
2. Names key, knife, penny.
3. Repeats three numbers.
4. Compares two lines.

V.

1. Compares two weights.
2. Copies square.
3. Repeats sentences of ten syllables.
4. Counts four pennies.
5. Solves card puzzle.

¹The writer wishes to acknowledge his indebtedness to Superintendent G. L. Chamberlain and to Principal Lombard of the Michigan Home for Feeble-Minded and Epileptic, and to Miss Carrie L. Dicken, principal of the W. S. Perry school of Ann Arbor, for assistance rendered him during the course of this investigation.

²BINET, A. ET SIMON, TH. *Le développement de l'intelligence chez les enfants*. L'Année psychologique, 1908, 14: 1-94.

³BINET, A. *Nouvelles recherches sur la mesure du niveau intellectuel chez les enfants d'école*. L'Année psychologique, 1911, 17: 145-201. This article contains the revised tests accompanied by a theoretical discussion; but it does not give directions for making the tests.

BINET, A. ET SIMON, TH. *La mesure du développement de l'intelligence chez les jeunes enfants*. Bulletin de la société libre pour l'étude psychologique de l'enfant. The revised scale is here given with detailed instructions for making the tests.

- VI.
 1. Distinguishes between morning and afternoon.
 2. Defines by use.
- VII, 4 3. Copies diamond.
 VII, 7 4. Counts thirteen pennies.
 5. Makes aesthetic comparison.
- VII.
 VI, 1 1. Shows right hand, left ear.
 2. Describes pictures.
 VI, 5 3. Executes three commissions.
- VIII, 2 4. Counts stamps.
 VIII, 3 5. Names four colors.
- VIII.
 1. Compares two objects from memory.
 2. Counts backwards from twenty to one.
- VII, 1 3. Perceives what is lacking in pictures.
 IX, 1 4. Knows the date.
- VII, 5 5. Repeats five figures.
- IX.
 1. Makes change.
 2. Gives definitions better than use.
- X, 2 3. Names nine pieces of money.
 X, 1 4. Repeats months of year in order.
 X, 4 5. Comprehends easy questions.
- X.
 IX, 6 1. Arranges five weights.
 New 2. Copies design from memory.
- XI, 1 3. Criticizes absurd sentences.
 4. Comprehends difficult questions.
 5. Uses three words in two sentences.
- XII.
 New 1. Resists suggestion.
- XI, 2 2. Uses three words in a single sentence.
 XI, 3 3. Gives sixty words in three minutes.
 XI, 4 4. Defines three abstract words.
 XI, 5 5. Puts dissected sentences together.
- XV.
 XII, 1 1. Repeats seven figures.
 XII, 2 2. Gives three rhymes.
 XII, 3 3. Repeats sentences of twenty-six syllables.
 XII, 4 4. Interprets pictures.
 XII, 5 5. Solves problems of diverse facts.
- Adult.
 XIII, 1 1. Draws design of cut paper unfolded.
 XIII, 2 2. Draws reversed triangle.
- *XIII, 3 3. Gives difference between abstract terms.
 New 4. Gives difference between president and king.
 New 5. Gives sense of selection read to him.

*Given in modified form in the 1911 series.

It will be noted from an examination of the revised series that while the tests up to six years remain the same, five important changes have been made in the more advanced ages.

In the first place, nine tests of the 1908 series have been omitted. The omitted tests are: Under age six. "Repeats

sentences of 16 syllables" and "Knows his age;" under age seven, "Knows number of fingers," "Copies phrase" and "Names four pieces of money;" under age eight, "Reads a selection" and "Writes from dictation;" and under age nine, "Repeats days of week" and "Gives six memories." Binet omitted "Repeats sentences of 16 syllables" because there is a similar test under age five. The other tests he omitted because they are influenced to a great extent by instruction given in the home and school, and for that reason are not true tests of intelligence. Those who have done much work with the Binet tests will doubtless feel that the scale has been improved by these omissions.

The next important change is in the addition of four new tests. They are: Under age ten, "Copies design from memory;" under age twelve, "Resists suggestion;" and under adult tests, "Gives difference between president and king" and "Gives sense of selection read to him." "Gives difference between abstract terms," which was a test under age thirteen in the 1908 series, has been modified somewhat and placed under the adult tests. For a description of these new tests see the article by Goddard entitled "A Revision of the Binet Scale," *The Training School*, June, 1911.

Twenty-six tests have been transposed. The transposed tests are indicated in the revised series given above by the Roman and Arabic numerals placed at the left of the tests. The Roman numeral indicates the year and the Arabic numeral the number of the test in the 1908 series. For example, opposite test three under age six are the numerals VII, 4, which mean that this test, "Copies diamond," was the test four under age seven in the 1908 series. It is apparent that the largest number of transpositions is in the tests of the higher ages. Binet found that the tests for the years eleven, twelve and thirteen were for the most part too difficult. As a result he has given no tests for age eleven, and has placed all the tests except one which were under that age under age twelve. The tests for age twelve he has placed under age fifteen. And the three tests which were under age thirteen he has included in the tests for adults, meaning by an adult a person who tests over fifteen.

The next significant change is in the number of tests. In the 1908 series the number of tests varied from three under age thirteen to eight under age seven. In the revised series there are five tests under each age except age four, which still has but four tests.

The last important change is in the method of counting. The highest age under which the subject correctly performs all the tests, instead of all but one, is now taken as the base. In the 1908 series, if the subject, for example, correctly performed all the tests under age six, all but one under age seven, three under age eight and two under age nine, age seven was taken as the base and the subject was given credit for an additional year for every five tests correctly performed above that age. In the supposed case he has correctly performed five tests under the ages above seven; hence his mental age is eight. But by the new method of counting, six, the year under which he correctly performed *all* the tests, is taken as a base, and, as in the other case, he is given credit for an additional year for every five tests correctly performed above the age which has been taken as the base.

In order to show the comparative merits of the two measuring scales, the writer presents here the results he obtained from testing 45 children in the first four grades of one of the Ann Arbor, Mich., schools, and 50 defectives, inmates of the Michigan Home for Feeble-Minded and Epileptic at Lapeer, Mich. The tests on the school children were made only during school hours and in a schoolroom provided for that purpose, where the experimenter was alone with the subject. The conditions under which the defectives were tested were equally favorable. The tests were made with such care that the experimenter had no reason to think that the subjects tested did not do the best of which they were capable. The age of the child at his last birthday was taken as the basis of comparison; that is, if a child who was seven years of age at his last birthday tested between seven and eight, he was called seven.

The results obtained from the two series of tests made on the 45 school children are shown in the following two tables. Table I shows the results by the 1908 tests and Table II the results by the 1911 tests. The tables are largely self-explanatory.

tory. The Arabic figures at the top of the tables indicate the physical age and the Roman numerals at the left the mental age. The figures in **heavy-faced type** indicate the number who tested at age, *i. e.*, those who have the same physical and mental ages:

TABLE I.—Binet, 1908.

Mental Age.	Physical Age.						
	6	7	8	9	10	11	12
VI	0						
VII	1	7	2	1			11
VIII	1	4	9	4	1	2	21
IX		1	3	3	2		10
X			1	1	1		3
Totals	2	12	15	9	4	2	45

TABLE II.—Binet, 1911.

Mental Age.	Physical Age.						
	6	7	8	9	10	11	12
VI	1	1					2
VII	1	10	7	1	1		20
VIII		1	7	6		2	16
IX			1	1	3		6
X				1			1
Totals	2	12	15	9	4	2	45

About the same number test at age in the two tables—20 in Table I and 19 in Table II. But when we compare the number over and under age we find a considerable difference. In Table I there are 12 over age, *i. e.*, their mental age is greater than their physical age, while in Table II there are but four over age. In Table I there are 13 under age, while in Table II there are 22. These results show that the same subjects tested by the two measuring scales do not test alike, but test lower by the 1911 series.

From a study of the results as presented in these tables we are unable to tell how much the subjects differ in mental age as measured by the two scales, for the results are given in round numbers. For example, if six were taken as the base, and the subject correctly performs seven or eight tests under the ages above six, his mental age, as given in Tables I and II, would be seven, one year for each additional five tests, fractions of five being neglected. But if we would be more exact in comparing the results secured by the two measuring scales,

these fractions must be taken into consideration, so that in the above case the subject's exact mental age would be seven and two-fifths or seven and three-fifths years instead of seven. Taking the fractions into consideration, we find that the number of normals and defectives testing the same in both series, higher in the 1911 series, and lower in the 1911 than in the 1908 series, is as follows:

	Normals.	Defectives.
Same	3	2
Higher	0	0
Lower	42	48
Lower by one year or more.....	1	11

It is significant that not one person tested higher by the 1911 series than by the 1908, and that only three normals and two feeble-minded tested the same, all the rest testing lower from one-fifth to one and one-fifth years. On the average the normal children tested two-fifths of a year lower, and the feeble-minded subjects three-fifths of a year lower by the 1911 than by the 1908 tests.

In attempting to account for the difference in results we must bear in mind that all the questions omitted in the revised series of tests are from ages six to nine, inclusive, and that no new tests are added before age ten. This means, other things being equal, that of the two scales the 1908 will test the higher in all those cases where the subjects perform any of the tests omitted in the 1911 series above the age taken as the base. And when we examine the records of the 12 subjects that differ by one year or more in mental age, we find that if the questions omitted in the revised measuring scale had not been counted in the 1908 series, four of the 12 subjects would have tested the same by both scales, four would have differed by only one-fifth of a year, one by three-fifths of a year, while the remaining three would not have been affected. The disparity of results in these latter three cases can be explained by the different method of counting used in the revised series of tests. By the 1908 scale the highest age under which all the tests, or all but one, are correctly performed is taken as the base, while in the revised scale only the highest age in which *all* the tests are correctly performed can be used as the base.

Under the higher ages especially, where the tests are not so well graded, this method of counting may make a great difference in the results. For it not infrequently happens that the subject may perform all the tests but one under age twelve or eleven and not do so well under the next lower age. This was the case with these three subjects. The bases by the 1908 scale were twelve, ten and twelve, and by the revised scale the base in each of the three cases was eight. If the revised method of counting had been employed in the 1908 series of tests, the results would have been no higher than those of the revised series. Evidently in such cases the revised method of counting gives the more accurate results, for surely the subject should not be rated as twelve years mentally if he cannot perform the tests under ages eleven and ten.

Many of the tests of the 1908 series have been transposed in the revision of 1911, and these changes have in some cases produced a slight difference in results.

Unfortunately, the number of normal children tested was not sufficiently great for us to draw any conclusions as to the value of the transposition of tests that Binet has made in the revised scale. Neither can we throw any light on the value of the new tests, as only eight of our subjects tested above nine mentally.

In the 1908 scale the number of tests under each age varied from three under age thirteen to eight under age seven. This lack of uniformity made it possible in some cases for one subject who had performed fewer tests than another to rank as high mentally. For example, if one subject performed all the tests under ages six and seven, his mental age would be seven, but if another subject failed in three of the tests under age seven and one under age six, his mental age also would be seven, for six would be the base and he would be given credit for an additional year for the tests performed under age seven. This defect has been remedied in the revision of 1911 by having the same number of tests under each age except age four.

It seems to the writer that the revised scale of 1911 is an improvement on the 1908 tests of intelligence in the following respects:

1. The tests which were most influenced by home and school instruction have been omitted.

2. The change in the method of counting reduces the liability of error.

3. The same number of tests under each age makes it impossible for one subject to rank as high mentally as another if he has not performed the same number of tests.

4. By the revised scale the subjects do not measure as high mentally as they do by the 1908 scale. This is an advantage as far as the lower ages are concerned, as it is probably true that the tests of the 1908 scale for the lower ages are too easy.

It is greatly to be hoped that Binet's revised tests will come into general use. We need standards, and standards can only be secured by the use of the same series of tests under the most carefully controlled conditions on large numbers of normal children.

PEDAGOGY AT THE BERLIN PSYCHOLOGICAL CONGRESS.¹

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The fifth congress of the German Society for Experimental Psychology was held in Berlin from the 16th to the 20th of April, 1912. The large attendance at the congress was due partly to the choice of location, but more to the growing appreciation of the theoretical and practical importance of psychology. Besides German psychologists, many representatives of the science from other countries (Münsterberg and Woodworth from America; McDougall, Myers and Spearman from England) and a number of distinguished educationists were present. At the last congress, in Innsbruck, borderland questions between psychology and psychiatry and between psychology and ethnology were prominent in the discussions, but at the present meeting pedagogical psychology and the applications of psychology to education were the topics of paramount interest. The pedagogical trend was impressed upon the visitor immediately on entering the building in which the congress was held. On the right as one passed through the large hall were collections of simple apparatus for experimental pedagogy and for instruction in psychology. At the left was the exhibit of the Institute for Applied Psychology, for which Lippman had prepared a very attractive catalogue that will be useful for subsequent reference. This exhibit contained what is probably the richest collection of materials for test experiments, psychological and pedagogical questionnaires, and methods of investigation and observation, that is to be found anywhere in the world.

Perhaps a third of the reports and addresses were more or less closely related to pedagogy. Of these we shall consider,

¹Translated from the author's manuscript. J. C. B.

first, a group which emphasized the significance of psychological investigations for other sciences, pedagogy among them; second, a group of papers which dealt with some of the fundamental problems of pedagogy; and third, discussions of theoretical psychology which are of especial interest to educators.

One of the most noteworthy addresses of the first group was that of Marbe on the importance of psychology for other sciences and for practical affairs. Marbe reviewed practically all the applications which exact psychology (both experimental and statistical) has already found in the domains of natural science, medicine, linguistics, philology, literary science, aesthetics, history, pedagogy, jurisprudence, political economy and philosophy. His argument was concerned not with possibilities of the future, nor with the fundamental question whether and to what extent these sciences should be based upon a psychological foundation, but rather with the established results of investigations whereby psychology has come into practical contact with these sciences. He thus regarded psychology from the point of view of an auxiliary rather than a basic science. The address will appear in expanded form in the first number of the new journal, *Fortschritte der Psychologie und ihrer Anwendungen*, edited by Marbe and published by B. G. Teubner, Leipzig. It forms a brief and very readable compendium of applied psychology, and gives numerous references to the literature of the problems discussed. The manifold applicability of psychological investigations to other fields of learning gives rise to a demand for a more adequate consideration of psychology in the lecture courses and prescribed examinations of German universities.

The modern psychology of the thought processes and its bearing upon education were discussed by Külpe. He emphasized the fact that through the discovery of non-representative elements of consciousness, as determining tendencies, conscious attitudes, imageless thought, etc., the center of interest in experimental psychology has shifted from the problems of sensation and perception to those of the "complex" psychic processes, as German psychologists say. The modern psychology of thinking is of great importance for the theory of knowledge, aesthetics, logic and pedagogy. With reference to the

latter Külpe calls for more attention to abstract thinking to counteract the prevalent tendency to overemphasize concrete object-lessons, urges investigations of the different types of thinking, and demands the introduction or reintroduction of formal exercises in thinking—exercises in definition, in analysis and in reasoning. In the interest of will training he recommends the strengthening of “determining tendencies” by specific practice. Külpe’s address has since appeared in the *Internationale Monatschrift für Wissenschaft, Kunst und Technik*.

Among the addresses which concerned themselves more strictly with educational psychology, Stern’s report on psychological methods of testing intelligence deserves especial mention. By intelligence Stern means the *general* capacity to adapt oneself mentally to new impressions, in contrast to *special* mental aptitudes. He reviewed the development of methods for testing intelligence, presented a somewhat detailed consideration of the Binet-Simon tests, and referred to the various correlations that have been worked out between the experimentally determined degree of intelligence and school standing, judgment of teachers, etc. In the ensuing discussion it was pointed out that the Binet-Simon tests were applicable only to the conditions of European and American civilization, and that other tests must be devised for studying the intelligence of primitive peoples.

The view that there is a general intelligence, distinct from special abilities, was also defended by Spearman in his interesting address on general mental capacity. At the outset he distinguished between three different theories as to the relations of single abilities to each other: The similarity theory, which assumes that high correlation exists only between those activities which are very similar; the type theory, which affirms that correlation of mental abilities is a function of certain types, and Spearman’s own theory of “general intelligence.” Spearman critically examined the mass of material presented in the literature of the past 32 years, and endeavored to demonstrate in it the presence of a “general intelligence” factor. He also included the physiological data that were favorable to his contention.

The problem of mental heredity was treated by the writer of the present report in a paper on "The Inheritance of Intellectual Capacities." He compared the school records of children, parents and grandparents, and found evidence of a rather far-reaching dependence of the attainments of children upon those of their ancestors. He also showed that this connection was by no means due to similarity of environment. Galton's law of ancestral heredity and the law of filial regression find confirmation in these results. The question as to the applicability of Mendel's laws must be left open for the present. In addition to this statistical treatment of the problem of heredity, the writer gave an account of school experiments testing the attainments of brothers and sisters of the same family, and discussed their significance for heredity studies. This investigation was unfinished when the congress met, but a complete account of it will appear in an early number of *Fortschritte der Psychologie und ihrer Anwendungen*.

The psychology of the choice of occupation was discussed by Maday of Prague. He pointed out the lack of accord which frequently exists between the occupation which one prefers and for which one is fitted and that which is forced on one, usually by social conditions. Adults find relief from the pressure of uncongenial callings in secondary occupations, sports and personal hobbies. The preferences of children for an occupation, according to a questionnaire of Maday's, depend on three things: Pleasure in passive movement from place to place (coachman, locomotive engineer), zest for fighting (soldier), and technical interest (builder, shipwright).

A more specific problem of psychological pedagogy was treated by Bühler in his address on "The Development of Abstract Thinking in School Children." He used Grünbaum's method in his experiments. A group of figures was shown to the pupils, and they were later called upon to recognize and identify certain members of the group when shown with other figures. Bühler found a striking increase in ability in the earlier school years, but in the later years the increase was less marked. The results showed striking individual differences in mental endowment. Bühler raises the question whether the improvement was due strictly to advance in age

or in part to school training. To decide this point he intends to have comparative experiments undertaken in South Africa on children who have had no school education.

Of the strictly psychological investigations that were of educational interest we may mention the papers on the psychology of memory. Rupp presented a systematic survey of the characteristics of memory. He considers the elementary functions of memory to be two in number—perseveration, or the tendency for an impression to persist in consciousness, and association, or the connection between two or more impressions. The psychic effects of these elementary factors are of a threefold nature: They may bring about (1) the revival of the experience; (2) a mere increase in receptivity (susceptibility) for this or a similar impression; (3) the arousal of the consciousness of familiarity on the repetition of this or a like impression.

G. E. Müller reported some interesting results of experiments carried on by one of his pupils. If a different kind of mental activity is interposed between the learning of a series of syllables and the reproduction of the series, the efficiency of the reproduction is diminished (retroactive inhibition). The experiments reported by Müller, however, show that such inhibition fails to appear if the memorized syllables are merely recognized and not actively reproduced. Recognition and reproduction, therefore, evidently depend upon different conditions.

Aall of Christiania found that stories and other memory materials are retained better if the subject is told beforehand that he will be required after the lapse of a considerable interval to reproduce what he has learned than if he is told that the reproduction will be called for within a short time. In one series of experiments he informed his subjects that they would be questioned the next day about what they had seen and heard, while in another series the time was set at four weeks. The next day he purposely neglected to ask for the material of the first series, but tested for both series at the expiration of four weeks. The material learned with the expectation of delayed reproduction was rendered more accurately than that learned for reproduction the next day.

Of the remaining addresses mention may be made of one by Wertheimer on the psychological analysis of the results of certain cortical lesions. The speaker made it seem probable that the disturbance in reading known as alexia is due not to any rupture of the associative connections between the optical and the acoustic-motor centers, but rather to a disturbance of "form perception." Alfred Lehmann reported a very carefully-conducted investigation on metabolism during mental work. By means of highly-refined methods he was able to establish the fact that in learning series of syllables and in adding with the Kraepelin reckoning books the excretion of carbonic acid is greater than during mental rest. In fatigue there is an analogous change of metabolism.

A glance over this brief report of the important pedagogical problems considered at the Berlin congress shows that not only was there evidence of a continued and intensified activity in the study of old questions, but that many new questions were raised which call for the application of exact methods. New demands for pedagogical investigation were not lacking. One need only refer to Külpe's observations, which make it appear that the fundamental principle of modern instruction, the principle of emphasis on sense perception (*Anschauung*), is in need of revision. In the extension of educational psychology to fields which heretofore have been accessible only to rough, casual observation lies the guarantee for the future of our science. For science, be it remembered, grows at its borders.

COMMUNICATIONS AND DISCUSSIONS.

THE EFFECT OF POSITION IN A MEMORIZED SERIES.

During the first half of the year 1912 an experiment was carried on under the direction of W. H. Winch to inquire whether the better way of learning tables was by rote or by practice. At one stage of the experiment the boys were given copies of their thirteen times table, which they had themselves constructed upon slips of paper, and were allowed six minutes to learn the table. Then, immediately afterwards, eight items of the table from thirteen twos to thirteen nines were questioned upon, though not in consecutive order. The writing down of the eight answers took one minute. This was done on four occasions on the mornings of the 25th, 29th, 31st of January and 2d of February. On the morning of the 5th, 7th, 9th and 12th of February similar work was done, but instead of using the thirteen times table the fourteen times table was used.

It was next necessary to mark these tables for the purpose of totaling results, and during the marking it struck me that there seemed to be a frequent recurrence of the same item of the table that was wrong. This idea gained ground as more papers were marked, until I decided to tabulate the whole of the results to see if the figures obtained would substantiate my general impression.

The subjoined table was drawn up in the following manner: After all the papers had been marked I decided to note every time an item of the table was put down wrongly. Hence the figures show the total number of mistakes made by the whole class of 26. When the error totals of the thirteen times table are examined it will be noticed that the errors for each item of the table are as follows:

2 times 3 errors	3 times 16 errors	4 times 29 errors	5 times 32 errors
6 times 32 errors	7 times 25 errors	8 times 21 errors	9 times 12 errors

From this it seems that the learner fixes the beginning and the end of the table and remembers them fairly well, but the middle of the table is much more doubtful.

On examination of the totals for the fourteen times table a similar development of errors will be noticed, for the figures run :

2 times	3 times	4 times	5 times
10 errors	24 errors	30 errors	24 errors
6 times	7 times	8 times	9 times
37 errors	36 errors	10 errors	10 errors

One break occurs in the series, however, at the five times item, but probably this may be accounted for by the arresting nature of the number seventy, with its easily-remembered nought:

Thirteen Times Table.

Date, 1912.	2 times.	3 times.	4 times.	5 times.	6 times.	7 times.	8 times.	9 times.
25-1	3	7	16	13	14	14	11	5
29-1	0	5	6	5	10	6	4	3
31-1	0	3	3	11	3	3	5	2
2-2	0	1	4	3	5	2	1	2
Total:	3	16	29	32	32	25	21	12

Fourteen Times Table.

5-2	4	11	9	9	10	9	4	5
7-2	5	6	6	6	7	15	4	2
9-2	0	2	8	4	10	6	1	0
12-2	1	5	7	5	10	6	1	3
Total:	10	24	30	24	37	36	10	10
Aggregate:	13	40	59	56	69	61	31	22

From the above results we might draw a conclusion of service in the learning of new tables: When the table is given to be memorized it would be well to change the order of the items now and again so that the middle of the table obtained an equal share of attention. Thus, instead of beginning with four times two and ending with four times nine, a change might be made by beginning the table with four times six and ending with four times seven, and so on for the next change, so that the middle items of the table (seen from the figures of the investigation to be overlooked) might come into the more favorable positions of beginning and end.

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RULES *VERSUS* DRILL IN TEACHING SPELLING.

The following results were obtained in a parallel-group test of rules *versus* drill in teaching spelling to eighth-grade pupils. The groups were divided upon the basis of grades secured in a common test. There were 16 pupils in each group. Group I was then given three 25-minute exercises, exclusively devoted to drill; Group II was given three 25-minute exercises, in two of which rules were taught and associated with type words and a minimum of drill required; a third period was devoted largely to drill. The results follow:

	Average in grouping test.	Average and A. D. in "B" test.	Average and A. D. in "C" test.	Average and A. D. in "D" test.	Average and A. D. in "E" test.
Group I (drill).	69.85	99.37 0.62	99. 1.75	61.56 11.87	76. 7.43
Group II (rules).	70.41	96. 5.	93.75 6.62	67.5 10.09	74. 10.56

The "B" test was given at the close of the third 25-minute period to both groups. The "C" test consisted of the same words as the "B" test, but was given five days later; both groups show a slight falling off in efficiency, but the drill group has lost relatively less than the rules group. The "D" test was made up of new words similar, however, to those of the "B" test, and, like the "B" test, was given at the close of the third 25-minute period; the rules group has a distinct advantage here. The "E" test consisted of the same words as the "D" test, given five days later; the drill group seems to have recovered the ground lost in the "D" test; the rules group gains a better average than in the "D" test, but the influence of the latter test is not so strongly marked as with the drill group.

It should be said that no time was given to the words being taught except during the 25-minute exercises. It should also be noted that each group was taught by a separate teacher, who did his best to "get results" under the conditions set by the experiment. The results in the "B," "C" and "D" tests are what might be expected on *a priori* grounds. The approximation of the two groups in the "E" test and the slightly poorer record of the drill group after its good

showing in the "D" test suggests an influence of intellectualizing drill processes that will be further investigated.

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E. A. TURNER.

SOME RESULTS IN MANUAL TRAINING.

At the end of the school year 1912 it was found that boys who had been working double periods in manual training did not come up to the requirement of doing twice as much work as those who worked single periods. Throughout the year 14 boys worked single periods and 9 boys worked double periods.

A hasty inspection of the time and grade cards (form shown on page 451 of the *Manual Training Magazine* for June, 1912) seemed to indicate that in general boys who worked double periods needed more time to complete a given exercise than those who worked single periods, and a careful comparison was made of the time and grades on seven drawings and four bench exercises which were done by all of the pupils. The results are shown in the accompanying table of averages.

Every record used for comparison was made during the same semester, in regular time and sequence, and under practically the same conditions. Records of boys who were irregular in attendance or who did not complete the year's work were not used:

TABLE OF AVERAGES.

Drawings and Exercises.	Time in periods required by boys working		Grade of boys working	
	One period.	Two periods.	One period.	Two periods.
Plate No. 1.....	9.75	6.00	78	71
Plate No. 2.....	6.72	6.80	80	78
Plate No. 3.....	7.63	8.75	80	77
Plate No. 4.....	7.84	10.60	75	71
Plate No. 5.....	5.57	12.00	73	75
Plate No. 6.....	3.25	3.40	85	81
Plate No. 7.....	3.25	3.00	85	86
Halved Splice.....	6.60	11.00	77	71
Splayed Splice.....	6.00	8.57	81	72
M-and-T Joint.....	5.60	7.14	78	78
K, M-and-T Joint.....	5.60	10.50	76	72
Grand Averages.....	6.16	7.98	79.8	72.9

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ABSTRACTS AND REVIEWS.

WILLIAM HENRY PYLE. *The Outlines of Educational Psychology*.
Baltimore: Warwick & York, 1911. Pp. X + 254. \$1.25.

This, the first general textbook in educational psychology to appear in America, is a brief, concise outline of the subject. The author has crowded into a very few pages an immense quantity of material valuable to students of education and to teachers. His style is clear, and his method of presentation, although sometimes dogmatic, is on the whole effective. In spite of condensation, the text proves unusually readable. Indeed, the reviewer has discovered that the average college student takes considerable satisfaction in most of Professor Pyle's chapters.

After describing the educational situation and defining education as "the process of preparing the individual for his life in society and of making a better society" (p. 3), the author presents in eight successive chapters certain of the most essential facts concerning the nature of the individual. A chapter is devoted to the discussion of body in its relations to mind. Another to the facts of heredity and their significance for education. Then follow six chapters on the instincts, which are considered under the headings individualistic, social, environmental and adaptive.

The remainder of the book is devoted to discussions of the nurture and of modes of directing the physical and mental development of the individual. Habit is discussed with respect to its chief characteristics, its relations to educational practices and to moral standards. Considerably less space is devoted to the treatment of habit and the various processes of learning than to instincts. Under the heading memory the principal results of studies of the learning process as well as of studies in the psychology and pedagogy of memory are presented. The reader is almost certain to feel the inadequacy of this chapter and to wish that it might have been further elaborated; but in criticizing the author we should keep in mind the fact that the text is intended not as an elaborate manual or an encyclopedic work, but as a sketch of the scientific groundwork of education, the elaboration

of which is left to the reader, and more especially to students in whose hands the text should be placed.

Brief chapters on attention and on fatigue complete the outline. Neither of these subjects is discussed very fully, although with each the author has dealt interestingly and suggestively.

At the end of each of the 15 chapters of Professor Pyle's textbook appears a list of "questions and topics for further study." These questions, we are informed, are such as have been asked by the author's students in educational psychology. Many of them are extremely good questions, although not a few are indefinite and discouraging, because it is impossible to give satisfactory answers. It may safely be said that the reader who carefully searches out from his own mind or from the literature of biology, psychology, sociology and education the materials which make possible the answering of these questions will have gained a most valuable knowledge of the scientific basis of educational practices.

A list of references to systematic treatises and original reports of experimental work appears at the end of each chapter. These references are well selected, and are invaluable to the student. English publications are used almost exclusively.

As the teacher or student casually examines this textbook he is certain to be surprised by the amount of space devoted to the instincts, and, after carefully reading the book, he is likely to conclude that it is quite disproportionate. Interesting and valuable as are the chapters which are devoted to the innate capacities of the individual, it seems only reasonable to object that more space relatively should have been given to the facts and laws of modifiability and to the varied problems and results of experimental education. The book may be adversely criticized on the score of its omissions. Every reader who is familiar with the materials of educational psychology and of the recently developed experimental pedagogy must regret the complete neglect of many important topics and aspects of these subjects. Nevertheless, the reviewer is convinced that the book will prove extremely useful in the hands of every intelligent teacher of educational psychology or of pedagogy, and he most heartily commends it to all who are interested in the discovery of an adequate scientific basis for our educational practices.

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J. J. VAN BIERVLIET. *Premiers Elements de Pedagogie Experimentale (a l'usage des Ecoles Normales). Les Bases.* Preface de M. Gabriel Compayre. Paris, 1911, pp. 335. Bound in paper, 7 francs.

This book is designed as a general introduction to experimental pedagogy. The first chapter is a general discussion of education. The author parts company with Binet, who said that the old pedagogy ought to be completely suppressed because it was based on preconceived ideas. Van Biervliet affirms that pedagogy has progressed, although it is still far from perfect. A universal criticism of the work of the school is that it is painful, not pleasurable, uninteresting, unhygienic and stereotyped. The principal aim of primary education, the formation and the healthful development of the intellectual faculties, has been imperfectly realized. The school fails to prepare for life. The two fundamental elements of classical pedagogy—introspective psychology and methodology deduced from the experience of pedagogues—are largely responsible for this condition. He would replace the first by the experimental psychology of childhood, and the second by experimental pedagogy.

The remaining chapters of the book are devoted to the methods of scientific psychology and the ordinary topics that are usually considered in a general elementary textbook in psychology. One hundred and fourteen pages are given over to the methods of scientific psychology and the nervous system. The author makes liberal use of experimental evidence of a general character. Little of it has any direct bearing on the work of the school.

The book is readable and interesting as an introduction to general psychology, but the writer seems to have made no contribution to experimental pedagogy. A second volume will aim to show the relation of psychological experiments to pedagogy. It would be well perhaps to postpone final judgment until a second volume appears. If we were to compare his first volume with the first volume of Meumann's *Experimentelle Pädagogik*, revised edition, Leipzig, 1911, it would not seem to have much promise. It has a tendency to consider practical problems through a telescope. A bibliography would have made the book more valuable.

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GEORGE TRUMBULL LADD. *The Teacher's Practical Philosophy*. New York: Funk & Wagnalls Company, 1911. Pp. 331.

"Teaching is a species of conduct, involving peculiarly close relations between two classes of persons; and all conduct is of necessity a moral affair." Such is the keynote of this series of talks to teachers, originally given under Government auspices in India and Japan. It is a note that needs to be sounded in educational circles at home at the present time, when the tendency is so strongly in the direction of method and theory of practice in teaching that we are in danger of forgetting all personal and moral relations of teacher and pupil.

C. E. S.

A. F. LAZURSKY AND A. P. NETSCHAJEFF, Editors. *Mental Life of Children*. With 91 illustrations in the text (Russian). Moscow: Antik & Co., 1910. Pp. 282.

The nine papers here presented are good summaries of modern investigations on school children and on children below school age. The editors call the papers "sketches in educational psychology." The book is published as a monograph of the Pedagogical Academy in St. Petersburg, and is a noteworthy contribution to Russian child study and experimental pedagogy.

The first paper, by N. Rumyanzev, the author of "Paidology" (St. Petersburg, 1909), deals with *past and present methods in studying the mental life of children* (pp. 1-55). Such a historical account is undoubtedly needed, and this paper furnishes a useful beginning in that direction, but the full history of the present epoch-making movement toward the systematic scientific study of school children is still to be written.

The second paper, by M. Steinhaus, discusses *heredity and environment* as educational factors (pp. 56-91). The title of this paper is misleading. It is a conglomeration of old hygienic data (Uffelmann is for him a great author on the care of babies!) and very meager applications, based mainly on second-hand information. The scientific treatises on heredity, such as those of Galton and Alphonse De Candolle, are not even mentioned.

The third paper takes up *memory* (pp. 92-114), with especial reference to the investigations of Ebbinghaus, G. E. Müller's school, Meumann's school, Netschajeff, Binet and Henri, and others. This and the following paper on *attention* (pp. 115-144) were written by A. Theoktistov. Both papers are good summaries, but many new

authors in those large fields of scientific investigation are ignored. The paper on attention includes the physiological and psychological interpretation of attention as an act, and its dependence upon the conditions of daily life. The author reviews the experimental investigation of attention in school children (Meumann's school), the interest and ideals of pupils, etc.

The fifth paper, by S. Popic, treats of the *development of imagination* in children (pp. 145-175), with especial reference to ability in drawing, as indicated in the recent studies of Stern, Kerschensteiner, Levenstein, Meumann, and others. The sixth paper considers *children's plays* (pp. 176-199). The author, M. Alexandrova, is much interested in the recent studies on the play of babies and school children. A photograph of Karl Groos is reproduced, and the article contains many illustrative pictures.

The seventh paper, by Y. Evergetov (pp. 200-220), gives an account of the development of the *child's vocabulary*, with frequent reference to C. and W. Stern's book on "Kindersprache." There is a picture of Professor W. Stern.

The eighth paper (pp. 221-256) was written by V. Rachmannova, and deals with the *main periods in the development* of the mental life of children. The last paper, written by N. Rumyanzev (pp. 257-282), presents studies of *children's character and personality*, including experimental investigations of the individuality of children.

The bibliographic references of these authors show that Russian pedagogical literature is extensive and up-to-date, including many translations of classic and modern educational works, and the whole book gives evidence of a vigorous movement in Russia for the scientific study of the child mind.

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W. H. WINCH. *When Should a Child Begin School?* Educational Psychology Monographs. Baltimore: Warwick & York, 1911. Pp. 98. \$1.25.

This monograph is an inquiry concerning the relationship between the age of entering school and subsequent progress or attainment. The author's method is statistical. Conclusions are based on coefficients of correlation derived from data collected over a wide area and from greatly varying situations. The conclusion "that from the entrance age of three to five, early entrance confers no intellectual

advantage on the child, either in his infant school work or in his subsequent progress in later school life," is the one we should have expected. Nothing that schools can do for children between the ages of three and five can ever be expected to offset individual differences which are due to heredity. Add to this fact the commonly accepted belief on the part of teachers that children cannot be expected to do much intellectual work until after they are five and any advantage which might be supposed to accrue to those entering earlier disappears entirely. Probably the best age to send a child to school is to be determined largely by the system of instruction organized in the schools which he is to attend. The writer believes that there are school systems where most children will be handicapped by entering after five to five and a half years, simply because the first serious year's work has been adapted to children of this group. In other school systems children enter a year or more older and complete a course of study as significant in a correspondingly shorter period. In the second type of school system the first year's serious work is adapted to the most mature children.

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WILLIAM JAMES. *Some Problems of Philosophy: A Beginning of an Introduction to Philosophy*. New York: Longmans, Green & Co. Pp. 237, xii.

The charge made against "Pragmatism, a New Name for Some Old Ways of Thinking," when it appeared in 1907, that many readers would think that they understood it when they really did not understand it, will not hold for this work by Professor James. He first named it an "introductory text-book for students in metaphysics," and when he left directions for its publication in its fragmentary and unrevised form he wrote, "Call it 'a beginning of an introduction to philosophy'; say that I hoped by it to round out my system, which now is too much like an arch built only on one side."

The author's viewpoint appears in the statements "Philosophy in the full sense is only *man thinking*, thinking about generalities rather than about particulars. I propose in this book to take philosophy in the narrow sense of metaphysics and to let both religion and the results of the sciences alone."

The problems considered are grouped under the terms being, percept and concept, the one and the many, novelty in relation to the infinite and to causality.

The two "chief rival attitudes towards life," rationalism and empiricism, with their many variations, are traced through the history of philosophy in a somewhat disconnected but very illuminating manner. The author's own emphasis upon pragmatism and the equally important though less commonly discussed "pluralistic or melioristic universe" constantly reveal the "attitude" of the book.

There is an appendix on "Faith and the Right to Believe," a reprint of a syllabus used in introductory courses at Harvard.

Professor James is, as usual, frank in his acknowledgments of indebtedness to others, notably here to Renouvier and Bergson.

FRANK A. MANNY.

HUGO MÜNSTERBERG. *Experimentalepsychologie und Berufswahl*. (Reprint from Zeits. f. Päd. Psych. u. exp. Pädagogik. January, 1912). P. 7.

The writer describes the development in America of schemes for guidance in choice of vocation, with special reference to the Boston bureau, instituted by the late Professor Parsons. This bureau undertook on the one hand to collect detailed information with regard to the requirements, the conditions for success, the outlook for advancement, etc., of numerous occupations, and on the other hand to discover for the individual applicant his capacities and incapacities, his interests, his tendencies—in a word, his physical and mental fitness for this or that calling. Parsons tried at first to determine this fitness by directing the individual to fill out at length answers to a printed series of questions. The difficulty here is obvious. One asks the applicant to tell one what the applicant comes to have discovered for him. The dilemma led naturally to the quest for a solution by appeal to the laboratory psychologist. Whatever may be the ultimate worth of mental tests for schoolroom practice, it is certain, in Münsterberg's opinion, that properly devised tests will yield a richer return when used for the determination of capacities suited to specific callings—presupposing a preliminary analysis of the mental functions demanded in the several callings and a suitable adaptation of the tests to the results of this analysis. Blunders are to be expected, but progress is as certain as it is necessary.

The writer also argues that, by means of this process of analysis, it is feasible to test by very simple means the ability implied in handling a very complex situation in actual life. For example, many callings put a premium upon the ability to "keep one's head"

in the face of a novel complex situation—in other words, to pass a quick and reliable judgment. Münsterberg has devised what he terms “The Situation Test” to determine the individual’s manner of meeting a complex situation. On each of 24 cards are printed 48 letters, arranged in chance distribution, but with the letter A, E, O or U in predominance—the degree of predominance differing somewhat on different cards. The subject sorts the cards into four piles, according as he judges (by impression, and not by counting) whether A, E, O or U predominates. The results are scaled in terms of speed and of accuracy of his decisions.

In the light of previous experimental work on the transfer of abilities, it is probable that many psychologists will need factual evidence before they are convinced that a test of speed and accuracy of a given individual in card-sorting can yield any information of value as to the speed and accuracy of decisions passed by the same individual under the concrete conditions of different industrial and professional callings.

The rise of interest in vocational psychology is due, in part, as the writer shows, to the work of Taylor and others in developing and applying the doctrines of “scientific management.” G. M. W.

J. E. W. WALLIN. *Experimental Oral Ethenics*. Reprinted from *Dental Cosmos*, April and May, 1912. Pp. 32.

This study is significant, both in its direct results and in its contribution to the method of experimental education. The author attempted to determine the effect of proper care and treatment of the teeth upon the improvement of mental traits and capacities in school children. The functions tested were (1) visual memory (reproduction method), (2) rapidity of thought (verbal associations), (3) speed and accuracy of adding columns of one-place digits, (4) speed and ability in association as measured by the “opposites” test, and (5) speed and accuracy of visual discrimination (A-test). The pupils were tested in May, before dental treatment began; at the opening of school in September, and in the following May. The dental treatment consisted in putting the teeth of the children in good condition, giving directions and furnishing materials for keeping the teeth and gums clean, and demonstrating proper methods of mastication. A monetary reward was offered to all who remained in the experimental class and followed the hygienic directions through the year, a school nurse visiting the homes and “checking” the fidelity of the children.

A control-group was planned for, but unfortunately this feature of the investigation could not be carried out. The group tested consisted entirely of retarded pupils. At the close of the year it was found that the average member of the group had improved about 50 per cent. in all the tests, and the author believes that this improvement can be traced largely to the beneficial influence of the dental hygiene. Although the group was made up of "repeaters," only one of the twenty-seven pupils failed of promotion at the close of the year. Regularity of attendance was improved and truancy eliminated. It is to be deplored that the parallel control-group could not have been organized and tested, for we have now only indirect means of inferring how much of the improvement was due to practice and incubation effects. Notwithstanding this vital defect, however, the study is most valuable and suggestive, and will serve as a starting point for future investigations of a similar character. It might be added that more detailed accounts of the dental treatment, and especially of the means by which the out-of-school phases of this treatment were "checked," would aid the reader in evaluating the results.

W. C. B.

WILLIAM STERN. *Die differentielle Psychologie in ihren methodischen Grundlagen*. Leipzig: Barth, 1911. Pp. 503. M 12.

In 1900 Stern's book, "*Ueber Psychologie der individuellen Differenzen*," appeared. When, some time ago, a new edition was asked for, Stern decided that the progress in this field had been so great that an entirely new book, with different aims, was needed; hence the present book. The older book dealt with beginnings and hints as to lines of development, but this book attempts to ground a new psychological science, and, therefore, the treatment of the subject is entirely different. Here we find the emphasis upon a discussion of the methods, aims, subject-matter, divisions and boundaries of the new science of individual differences rather than upon the enumeration of special results thus far attained.

In subject-matter we have the whole field of individual variations. While general psychology ignores differences in order to reach common characteristics and thus develop laws and principles, individual psychology takes for its subject-matter these variations, their kinds, degrees, causes and laws, and the individuals who exhibit the variations. From the practical point of view this science aims to tell us how to know, judge, classify and use men individually or in groups.

and to understand the interaction of men upon one another as it occurs, for example, in education, law and medicine.

Individual and *characteristic* are the two chief concepts of this science. Characteristics are of three types: *phenomena* or immediate physical and psychical experiences as such, *acts* or synthetic groups of activities with a definite direction or goal, as digestion or walking, and *dispositions* or the potential and chronic, instead of acute, phases of experience, as temperament, character, inheritance, genius, etc.

The whole subject of individual psychology is divided into four main divisions, based upon the fact that we can study four different relationships between characteristics and individuals. The first division, called *variation*, is the study of one characteristic in many individuals; the second, named *correlation*, is the study of two or more characteristics in many individuals; the third, christened *psychography*, is the study of one individual in regard to many characteristics; the fourth, called *comparison* (Komparation), is the study of two or more individuals in regard to many characteristics.

The first part of the book deals with the methodology of the subject. The usual psychological methods are studied and their application to individual psychology discussed at length. Then the methods more peculiar to this field, as, for example, the test, questionnaire, historical methods, etc., receive consideration. To this treatment the author devotes 120 pages. The second part of the book deals with the first two great divisions of the science, variation and correlation, and includes 160 pages. Among the topics discussed are total and partial variation, the normal, the subnormal, the supernormal, psychological types, subdivisions of types, statistical treatment of variation, variability, correlation, aims of correlation and correlation statistics. The third part of the book deals with the other two great divisions of the subject, psychography and comparison. Here the problem of individuality, the aims of psychography, the psychogram (account of an individual gained by psychographical methods), the psychographic scheme to be followed in getting the psychogram, the comparison of the psychograms of different individuals, and other problems are discussed. The fourth part is a very full, classified bibliography of the whole subject. In about 120 pages the author presents an exhaustive list of those books which bear directly upon individual psychology and a wide selection of books that touch upon certain aspects of the subject.

It is impossible in a brief review to give an account of the variety of classifications and methodological distinctions that the author makes. The whole book gives evidence of the earnestness with which Stern has set about the task of emancipating this branch of psychological study from the mother science, and giving it a logical basis and framework for future development.

C. L. VAUGHAN.

Brooklyn Training School for Teachers.

ANDREW FLEMING WEST. *Education and Intelligence*. Reprint from the New York Times and Philadelphia Public Ledger of September 23, 1911. Pp. 16.

Here the dean of the graduate school of Princeton University relieves his mind of a number of disturbing considerations about our educational system and its output. He thinks the irreconcilable differences among educated men and the chaotic condition of educated opinion are due to the "patent fact that a good many of our so-called 'educated men' are not really intelligent; that they are, in fact, men of unintelligent intellectual behavior, some of them superficially versed in a number of things somewhat badly understood, some of them sharply clear in a narrow way." Dean West says he is not talking about stupidity, but about the unconscious ignorance of the supposedly educated man, who "utters what he thinks, supposing it to be what he knows."

We do not follow the argument very clearly from this point on, being doubtless unintelligent ourselves, but it appears that our educational system has been equipped with clever machinery, but is not run with intelligence. We are afflicted with the "vagaries of 'child psychology' and the fads which now beguile childhood with the notion that organized play is study." We secure uniform, machine, but mediocre, results. We strive blindly to be practical, useful, vocational, but forget that the 'something more' is more important than breadwinning. Particular knowledge is not enough. Educated men should also be intelligent.

As Dean West admits that education "may tone, but cannot destroy," the natural temperamental differences in men, and that "the errors of crass untrained ignorance," like dullness itself, seem to be ineradicable, he might have helped us out by laying down a recipe for securing general attainment of the blessed intelligent education that he desires.

CORNELIUS HOOD.

Cornell University.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

INCLUDING EXPERIMENTAL PEDAGOGY, CHILD PHYSIOLOGY
AND HYGIENE, AND EDUCATIONAL STATISTICS

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EDITORIALS.

The modern science and art of treating mental diseases is founded upon psychology. Although applied science in this field is truly in the inceptive stage, a sufficient foundation has been laid to encourage the employment of psychological technicians in institutions and organizations which deal with mental derangements. The psychologist will never find himself in the institutional work so long as he regards himself primarily as a research man. To get professional standing for applied psychology the typical representative of this work must devote himself primarily, consistently and by preference to the routine of care and treatment. The time has now come for practical technicians in applied psychology who are not primarily research men, consulting psychologists or physicians. Let us call them simply *psychologists*.

Such a technician may have a wide field of usefulness, *e. g.*, as scientific expert in institutions he might sift the results of research

in applied psychology and adapt them to specific needs; he might be detailed to devise and test new psychological methods of examination and treatment; he might act as expert in the psychological study of special cases; he might offer to nurses and attendants courses of instruction from the point of view of applied psychology; he might conduct psychological research with a distinctly practical, usually immediate, end in view, and he might serve as representative of his institution in its relation to institutions for research and other theoretical and applied work in psychology.

The demand for preparation of such a psychologist must not be extravagant; the training in laboratory psychology should be thorough, but a full medical course is not required. Women might well qualify for the position and find it an attractive field. The rank and salary should be about that of a physician, in order to give the profession stability. His position must be recognized as that of practical psychologist—not superintendent, examiner or physician, or a substitute for any of them. Yet, as technician, the psychologist is at the command of the superintendent and other members of the staff for the routine work for which he is peculiarly qualified, and this routine work is his main business. The little “free” research that he can do must be done on his own initiative, or in co-operation with other qualified research men, and not, as a rule, under the direction of the superintendent or the institutional physician. This type of psychologist is scarcely available yet, but will appear as the needs become felt. What we now need is a whole-hearted recognition of the opportunities for such a modest profession. C. E. S.

It appears to be the fashion in some quarters to decry the use of competition as an incentive for school work. It is pointed out that competition enlists active work from only a limited number of the pupils, those who entertain hopes of success in the trial of wits and skill, that it arouses jealousy and bitterness, and that it may lead pupils of poor vitality to bankrupt their health. It is argued, moreover, that the spirit of competition is foreign to the ideal atmosphere of quiet assimilation of learning. On the other hand, that competition is a most powerful incentive to work, and that it constitutes a main factor in the motivation of activities outside the school is self-evident. More than this, it would seem that

**ARE WE AFRAID
OF COMPETITION?**

competition is particularly valuable in developing the capacities of pupils of more than average ability. In a school system that makes free use of competition, pupils of more than usual promise are speedily singled out, and the way is smoothed for their advancement. These reflections have been inspired particularly by contemplation of the competitive features of the English schools. The reader of such a periodical as *The Educational Times* of London cannot fail to be impressed by the page or two of announcements that appear monthly under the caption, "The Educational Ladder." The number of scholarships, fellowships, prizes, exhibitions and other scholastic rewards is nothing short of astounding to the American reader who is unfamiliar with the use made of these devices by our cousins across the water. One can scarcely escape the conviction that we might well introduce a larger amount of competition into the American school system.

In all civilized countries the accepted tests of educational proficiency are examinations. Yet many teachers resent examinations,

and it is quite a common thing nowadays to find educational theorists inveighing against them. A writer in the *Mathematics Teacher* for June delivers himself as follows: "The

THE FUNCTION OF EXAMINATIONS.

policy of standardizing everything by examinations is doing our expensive school system an untold injury; the report of the city superintendent compares the schools according to the number of their pupils who pass the examinations, and the principal warns the teacher that he is rated according to the number of his pupils that pass, and this pressure is passed on to the pupil. Until some method of close classroom observation and supervision is introduced with a view to allowing free rein to a teacher's individuality and originality, even at the expense of his pupils' failing the conventional examinations, it is hardly worth while suggesting other changes."

This writer obviously has a grievance. What is its justification? Surely he would not deny that it is desirable for the teacher to know precisely what progress his pupils are making. Without a continuous adjustment of the work to the pupils' advancing attainments no efficiency in teaching is possible. Nor do we see how a school system can be successfully conducted without some sort of unification and standardization. It should, indeed, be the business

of the teacher to stimulate the pupil to "pass" a certain mark in his educational progress, provided the standard is commensurate with the pupil's mental abilities. The trouble lies in a conflict of aims as to what these particular children should be expected to do as a result of their term's work. The conventional examination is set from without, and rarely offers a real test of the work done by the individuals of the class. Both pupils and teachers feel that the result is largely a matter of luck, and resent the introduction of this foreign and disturbing element. The thing that should be kept in mind by both superintendent and teacher is what progress has the pupil made? This could perhaps best be determined by testing the pupil at regular intervals by means of objective tests arranged in the form of scales. It would be a great gain if the pupil himself were able at any time to determine his own performance and progress as measured on such a scale. In any event, it is the pupil that should occupy the focus of attention rather than the teacher, or the superintendent, or the system. Teachers who complain that objective tests crush out their individuality and originality too often use these terms to conceal planlessness and lack of thought for the pupil.

J. C. B.

NOTES AND NEWS.

The Fourth International Congress of Physical Education will be held at Rome, October 24-27. Among the topics for discussion will be rational methods of physical education, open-air schools, sports, preparation for military service, etc.

The Physical Education Association of the Pacific Coast held its first annual conference at Berkeley, Cal., July 26 and 27, 1912. Among the addresses were the following: "The Function of the Physical Educator," Clark W. Hetherington; "Instruction in Personal Hygiene in the Public Schools," M. A. Bigelow; "Present Movements Tending Toward Moral Education and Their Relative Values," C. E. Rugh; and "Physical Education as Fundamental to Modern Education," R. B. Boone. A feature of the conference was the demonstration of dancing and gymnastic drill in the Greek theater on the evening of July 26.

Considerable dissatisfaction is expressed with the attitude of the English Board of Education toward the matter of the medical treatment of school children. Instead of the hoped-for £200,000, the estimates provide for only £60,000, a sum which is characterized by *School Hygiene* as "niggardly." The policy of the Board is to bring medical inspection completely under the control of the medical officers of health—a course which will result in the treatment of school children by medical men who have no clinical experience, who are completely out of touch with current medical work and for whom "the child is only a thing to be weighed and measured (once in a lifetime) and scheduled."

The annual conference of the English Child Study Society was held in London, May 9-11, 1912. The general subject for consideration at the conference was The Health of the Child in Relation to Its Mental and Physical Development, and, as the papers were printed in advance, the entire time was devoted to a discussion of the issues presented. Dr. C. W. Saleeby, in a lecture on Eugenics and Child Study, emphasized the necessity for a careful study of the nature of the child as a foundation for eugenics. He vigorously attacked the work of Professor Karl Pearson and his school for neglecting this important phase of the subject. "Only child study will distinguish between the characters that are natural, and therefore transmissible and of eugenic importance and those which are non-transmissible and irrelevant for eugenics."

The *Revue Psychologique* urges the establishment of an International Bureau of Paidology, one of whose functions would be to decide upon the questions to be discussed at future international congresses of paidology. Among such questions the following are suggested: the relations between paidology and pedagogy; a complete classification of terms and methods; unification of measurements in all the fields of paidology; the place of paidology in a classification of the sciences; the use of tests in paidology; and the important points in the study of correlations, and the abbreviations of titles, periodicals and books.

Professor N. Vinogradoff of Moscow is revising for publication in the immediate future a Russian translation of Professor Whipple's *Manual of Mental and Physical Tests*.

Dr. Wilhelm Wundt, professor of philosophy in the University of Leipzig, one of the founders of modern psychology, celebrated his eightieth birthday on August 16, on which occasion a "Wilhelm Wundt Stiftung," amounting to 7000 marks, was presented to the university by his students and friends.—*Science*.

Professor G. M. Whipple has delivered at the summer session of the University of Illinois a series of three lectures, one upon "The Training of Memory," one upon "The Psychology of the Marking System" and one upon "The Supernormal Child."

Dr. Irwin Shepard of Winona, Minn., has resigned the secretaryship of the National Education Association after twenty years of faithful and valuable service.

Professor Edwin D. Starbuck has been granted a year's leave of absence from the University of Iowa for the purpose of engaging in expert psychological work in religious education for the Beacon Press, Boston.

Professor W. A. Jessup, who was recently appointed dean of the School of Education at the University of Indiana, has resigned this position to become Director of the School of Education at the University of Iowa.

Dr. J. Anna Norris of the School of Education at the University of Chicago was recently elected by the board of regents of the University of Minnesota as head of the department of health and physical training for women. She will also occupy the newly created position of woman's physician in that university. Dr. Norris has been for the last five years instructor in hygiene and physical education and assistant medical director in the School of Education at Chicago.

PUBLICATIONS RECEIVED TO SEPTEMBER 1, 1912.

(Notice in this section does not preclude a more extended review.)

FANNY FERN ANDREWS. *Peace Day. Suggestions and Material for Its Observance in the Schools.* Bulletin 476. Washington: Bureau of Education, 1912. Pp. 46.

LEONARD P. AYRES. *The Measurement of Educational Processes and Products.* New York: Russell Sage Foundation, 1912. Pp. 9.

A sketch of the progress that has been made in the past decade in the application of experimental and statistical methods of investigation to the problems of education. "The certainty about the scientific method in education is that it is with us. That it will develop enormously in the immediate future is entirely sure. * * * What is to be our attitude toward each new contribution? My own answer is that we must welcome them all, but challenge them all, and attempt to verify them all."

Bibliography of Education in Agriculture and Home Economics. Bulletin 481. Washington: Bureau of Education, 1912. Pp. 62.

ROBERTO BONALO. *Non-Euclidean Geometry.* Authorized English translation by H. S. Carshaw, with an introduction by Federico Enriques. Chicago: Open Court Publishing Co., 1912. Pp. xii, 268.

An elementary, historical and critical exposition of the subject, including chapters on the attempts to prove Euclid's parallel postulate; the forerunners of non-Euclidean geometry; the founders of the science and its later development. Appendices discuss the fundamental principles of statics in their relation to Euclid's postulate, the Clifford-Klein problem, non-Euclidean parallel construction, the independence of projective geometry and the impossibility of proving Euclid's postulate.

A suggested program for Peace Day exercises, with the readings, recitations, songs, extracts, etc., required. There is also a representative bibliography of peace literature.

The Book of the Educational Exhibit of Greenwich, Connecticut. Greenwich: 1912. Pp. 24.

Seldom does one find such a scathing arraignment of a commu-

nity's negligence in educational matters as is set forth in this richly-illustrated report made at the town's request by Dr. Ayres of the Russell Sage Foundation. The second richest town in America has school buildings which, as shown by photographs, present intolerable sanitary conditions. It is to be hoped that this report will so arouse the civic consciousness that an immediate change of policy will result.

HENRY ELDRIDGE BOURNE AND ELBERT JAY BENTON. *Introductory American History*. New York: D. C. Heath & Co., 1912. Pp. vii, 264.

This introduction is in accordance with the new plan of the study of history recommended by the Committee of Eight of the American Historical Association. The whole book centers about the theme of migration. The first 10 chapters deal in simple story form, with a comparison of our immigration with the earliest migrations, and the stories of the Greeks and the Romans and what we owe to them. Chapters 10 to 14 tell of the migration spirit in medieval Europe as shown in conquest, exploration and trade, and the remaining chapters present the Spanish, French and English explorations in America. The account is fascinatingly told and attractively illustrated.

JAMES C. BOYKIN, Editor. *Current Educational Topics*. No. 1. Bulletin No. 482. Washington: Bureau of Education, 1912. Pp. 26.

The topics discussed in this report are as follows: 1. Illiteracy in the United States and in Europe. 2. Industrial Supervisors in Georgia. 3. New Phases of Education in Buffalo, N. Y. 4. Juvenile Labor Bureaus and Vocational Guidance in Great Britain. 5. The Educational Museum of the St. Louis Public Schools.

PERCIVAL CHURCH AND HIS ASSOCIATES. *Festivals and Plays in Schools and Elsewhere*. New York: Harper & Bros., 1912. Pp. xxii, 403. \$2 net.

Festivals, plays and dramatizations of historical and mythical incidents have come into school procedure to stay. Indeed, it may confidently be predicted that the next decade will witness a great increase in the esteem in which these activities are held. For one thing, they are based upon fundamental psychological characteristics of the child. The whole mental structure of the school child is essentially dramatic if it is freed from the restrictions of fear and repression. The authors of this book, who are the recognized leaders in festival organization in the country, have produced a practical handbook which incorporates the solutions to the problems of the festival which have been worked out by the Festival Committee of the Ethical Culture School of New York City. But in almost every chapter of the book one finds observations and suggestions of pro-

found psychological and pedagogical import. Our teachers are to be congratulated on having this material made available for them.

GEORGE V. N. DEARBORN. *Notes on the Neurology of Voluntary Movement*. Reprinted from *The Medical Record*, May 18, 1912. Pp. 48.

Most psychologists profess their allegiance to some form of psychophysical parallelism, but ostentatiously leave to the neurologists the task of tracing the neural correlates of mental activities. As a result, few attempts have been made to construct a representation of the neural processes which probably underlie the rational control of action. A notable exception is the recent work of Max Meyer on *The Fundamental Laws of Human Behavior*. For the student of behavior, however, it is of interest and possibly of importance to consider the mechanism of control, and the present article offers a stimulating analysis of the problem. Part I gives us a biological orientation, Part II deals with the development of voluntary movement in the infant, and Part III discusses the adult neurology of voluntary movement.

PAUL DEUSSEN. *The System of the Vedanta*. Authorized translation by Chas. Johnston. Chicago: Open Court Publishing Co., 1912. Pp. xvi, 513.

An exposition of the postulates of Brahmanism, following closely the classic works of Badarayana and Cankara.

ERNEST WILDER FELLOWS. *A Comparative Study of City School and Rural School Attendance*. University of Iowa Studies in Education, Vol I, No. 2, April, 1912. Pp. 28.

An intensive study of school attendance in Crawford County, Iowa, on the basis of information gathered directly from the teachers for the purposes of this investigation, shows that boys and girls in the country drop out of school entirely about a year younger than those in town. Urban pupils maintain a given average number of days attended until they are from two to five years older than rural pupils maintaining the same average. Rural pupils from twelve to seventeen years of age attend school only about half as many days per year as those in the town. Although town teachers are paid higher wages, the cost for teachers per pupil per day is 25 per cent. higher in rural schools, and although town schools have better equipment and better buildings, the cost for maintenance per pupil per day is 18 per cent. higher in the country.

J. J. FINDLAY, M.A., PH.D. *The School: An Introduction to the Study of Education*. (The Home University Library of Modern

Knowledge, No. 32.) New York: Henry Holt & Co., 1912. Pp. viii, 256. 50 cents net.

The author, who is professor of education in Manchester University, England, has aimed to provide a readable account of the general principles of education in such a form as to be valuable to the teacher in training and also to the citizen who wants to acquaint himself with the origin, problems and methods of the school. The scope of treatment includes biological and psychological as well as sociological phases of the educational problem. The chapters on the function of the school and on the teacher strike us especially favorably. The volume, despite its natural reference to English rather than to American schools, is sufficiently broad to be of use in normal schools and college departments of education as material for reading by teachers in training.

P. HACHET-SOUPLET. *La genese des instincts: Etude experimentale*. Paris: E. Flammarion, 1912. Pp. 327. 3.50 fr.

In Book I of this work the author reviews and criticises the current methods in animal psychology and comments on the favor which this study enjoys at present in France. Book II discusses instinct from the static point of view, argues that the theory of tropisms is untenable, and points out the distinctions between intelligent and instinctive behavior. Book III gives a résumé of analytic and experimental researches which professedly show the evolution of instincts from habits (sic), and Book IV presents studies of particular instincts, such as the hexagonal comb-building of the bee.

G. STANLEY HALL. *Founders of Modern Psychology*. New York: D. Appleton & Co., 1912. Pp. viii, \$2.50 net.

This book is an extension and amplification of a course of lectures delivered last winter before the department of psychology in Columbia University. The author has performed a real service in bringing to the notice of English readers the lives and thoughts of six of the great German psychologists of the past half-century. These are Eduard Zeller, Rudolph Hermann Lotze, Gustav Theodor Fechner, Eduard von Hartmann, Hermann L. F. von Helmholtz and Wilhelm Wundt. During his six years' residence in Germany the author came into personal contact with each of these great pioneers. He was perhaps the only American psychologist who attempted experimental work with Helmholtz, and was the first American pupil of Wundt. The book is, therefore, replete with intimate personal touches and characterizations, which make it invaluable.

H. L. HOLLINGSWORTH. *The Influence of Caffein on Mental and Motor Efficiency*. Archives of Psychology, No. 22, April, 1912. Pp. v, 166.

An elaborate experimental study on the effects of caffein in small,

medium and large doses, showing that in most cases the drug acts as a mild stimulant, persisting from three to twenty-four hours, with no secondary reaction. "Rivers' conclusion that 'cafein increases the capacity for both muscular and mental work * * * without there being any evidence, with moderate doses, of reaction leading to diminished capacity for work,' is thoroughly confirmed by the results of all the present experiments."

EDMUND B. HUEY. *A Syllabus for the Clinical Examination of Children, together with Blanks for a Complete Record of the Examination.* Baltimore: Warwick & York, 1912. Pp. 45. Syllabus, 35 cents. Blanks, 40 cents per dozen. Clinical Reference Cards, 30 cents per dozen.

This syllabus offers an excellent guide for anyone who desires to use the Binet-Simon tests of intelligence, giving full directions for their application. The blanks not only furnish a convenient form of record for the results of these tests, but include a point scale for 19 other tests of intelligence, a home record and personal history, and a school report of physical and mental conditions.

Influences Tending to Improve the Work of the Teacher of Mathematics. International Commission on the Teaching of Mathematics. American Report, Committee No. VIII. Bulletin 485. Washington: Bureau of Education, 1912. Pp. 47.

The agencies considered include scientific societies and periodical literature, teachers' associations, teachers' institutes, state supervision, publishers and agents, and summer sessions of universities and normal schools. State supervision is poor and ineffective, while the influence of publishers and their agents has been highly beneficial.

GEORGE W. JACOBY, M.D. *Suggestion and Psychotherapy.* New York: Charles Scribner's Sons, 1912. Pp. 355. \$1.50 net.

A commendable popular presentation of the subjects treated. Part I deals with suggestion from two points of view: that of psychology, a field in which the author does not seem to be altogether at home, and that of neurology and psycho-pathology, where he moves with greater freedom. This part concludes with numerous historical examples of suggestion. Part II, psychotherapy, is the most valuable portion of the book, especially on account of comments and criticisms on prevalent methods.

WILLIAM HEARD KILPATRICK. *The Dutch Schools of New Netherland and Colonial New York.* Bulletin 483. Washington: Bureau of Education, 1912. Pp. 239.

This admirable work is an example of the kind of research in the

history of education that is so much needed in every state in the Union. There is much good material for the history of the development of local educational agencies which awaits the enlivening touch of the painstaking investigator. An adequate picture of the educational past can be portrayed only by limiting one's energies to a narrow field. The author has considered only the Dutch schools, neglecting the early English schools of New York. Of especial interest is chapter fourteen, which discusses the elementary school from within and gives a vivid characterization of the educational procedure of the time.

HELEN MACMURCHY. *Feeble-Minded in Ontario*. Fourth and Fifth Reports, for the Years 1909 and 1910. Toronto: L. K. Cameron, 1911. Pp. 50 and 55.

A survey of conditions in Ontario, and an account of the measures taken to care for the feeble-minded in that province.

HELEN MACMURCHY. *Infant Mortality*. Third Report. Toronto: L. K. Cameron, 1912. Pp. 75.

The author sets forth the reasons for the high rate of infant mortality in Canada, and pleads for better sanitation and a campaign of enlightenment on the treatment of the new-born.

HANS POHLMANN. *Beitrag zur Psychologie des Schulkinde*s. Leipzig: Otto Nemnich, 1912. Pp. 314. M. 8.50. Geb. M. 10.00.

This important experimental investigation is Volume XIII of Meumann's Pedagogical Monographs, and we are told in the subtitle that it rests on "the basis of systematic, empirical researches on the development of the understanding for words and the attendant linguistic and psychological problems in children from five to fourteen years of age." Eighty-five words belonging to 10 different classes of meaning were proposed singly to each of 126 children for definition. The answers to each word are tabulated according to the ages of the children. The development of verbal meanings seems to be purely accidental and in no way determined by logical considerations.

The Relations of Psychology and Medical Education. A Symposium by SHEPHERD IVORY FRANZ, ADOLF MEYER, E. E. SOUTHARD, JOHN B. WATSON and MORTON PRINCE. Reprinted from the Journal of the American Medical Association, 58: March 30, 1912, pp. 909-921.

All the writers agree as to the desirability of a more careful study of mental phenomena by medical students, but opinions differ as to the particular type of psychology that will be most serviceable to the physician.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

AN INVESTIGATION ON THE VALUE OF DRILL WORK IN THE FUNDAMENTAL OPERATIONS OF ARITHMETIC.

PART I.

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In the issue of *THE JOURNAL OF EDUCATIONAL PSYCHOLOGY* for February, 1911, the writer reported the results of an investigation upon the above topic. The investigation was conducted at the Eastern Illinois State Normal School and included the pupils of the sixth, seventh and eighth grades in the practice school. The total number of pupils examined was 51,—18 boys and 33 girls.

The effects of the drill in fundamentals were shown by a comparison of sections subjected to the drill with sections of equal size and approximately equal ability not subjected to the drill, but otherwise undergoing the same arithmetic instruction. The effects of the drill were most marked in the sixth grade and least in the eighth, although the results were significant in all three grades. The improvement caused by the drill was very apparent after the lapse of the 12 weeks' summer vacation.

The results of the investigation were of so positive a nature that the writer decided to extend it to the sixth grades of several school systems in order to secure additional data relative to the value of brief drill periods in arithmetic. The tests given in the school systems were identical in every respect with those given in the first investigation, details of which will

be found in the issue of February, 1911. After giving a summary of the results of the first investigation the results of the second study will be stated.

In the first investigation the drill section had been given five minutes' drill daily for 30 recitation periods, and the non-drill class had had no drill. In all of the summaries that follow "I" indicates the combined drill section and "II" the combined non-drill section.

SUMMARY OF RESULTS OF FIRST INVESTIGATION.

A Comparison of the Results of the First and Second Tests.

- I did 21.2 per cent. better on second test than on first in number of problems worked.
- II did 9.8 per cent. better on second test than on first in number of problems worked.
- I did 33.4 per cent. better on second test than on first in addition.
- II did 11.8 per cent. better on second test than on first in addition.
- I did 36.9 per cent. better on second test than on first in subtraction.
- II did 13.1 per cent. better on second test than on first in subtraction.
- I did 30. per cent. better on second test than on first in multiplication.
- II did 13.7 per cent. better on second test than on first in multiplication.
- I did 28. per cent. better on second test than on first in division.
- II did 19.3 per cent. better on second test than on first in division.
- I did 32. per cent. better on second test than on first in total number points made.
- II did 14.7 per cent. better on second test than on first in total number points made.
- I did 5.8 per cent. better on second test than on first on first six problems.
- II did 2.4 per cent. poorer on second test than on first on first six problems.

The number of problems worked in each test may be taken as a measure of the speed of the pupils. It is seen that the drill section increased its speed by a much larger per cent. than the non-drill section.

The drill section of the sixth grade made the greatest increase in speed, 35 per cent. The seventh grade drill section made a gain of 20 per cent., and the eighth grade of 13.8 per cent. in speed.

Since all of the pupils of all of the sections worked at least the first six problems, a comparison of the number of points scored on these problems affords a fair measure of the effect of the drill upon accuracy in the fundamental operations. The accuracy of the drill class, measured in this way, increased 5.8 per cent., while that of the non-drill class decreased 2.4 per cent.

The drill section of the sixth grade also made the greatest improvement upon its own record on the total number of points scored, a gain of 52.3 per cent. The seventh grade drill section made a gain of 33.5 per cent., and the eighth a gain of 19.5 per cent. The drill exercise proved about equally valuable to both boys and girls.

In the following table the first test was given before the drill was begun, the second test was given immediately after the 30 days' drill, and the third test was given on the first day of the fall term, after a vacation of 12 weeks:

A Comparison of the Results of the Third Test with the First and Second.

("I" indicates combined drill sections. "II" the non-drill sections.)

- I did 26.4 per cent. better than on first test and 4.1 per cent. better than on second test in number of problems worked.
- II did 9.8 per cent. better than on first test and same as on second test in number of problems worked.
- I did 25.4 per cent. better than on first test and 6 per cent. poorer than on second test in addition.
- II did 7.7 per cent. better than on first test and 3.7 per cent. poorer than on second test in addition.
- I did 46.2 per cent. better than on first test and 6.7 per cent. better than on second test in subtraction.
- II did 20.4 per cent. better than on first test and 6.4 per cent. better than on second test in subtraction.
- I did 31.3 per cent. better than on first test and 1.5 per cent. better than on second test in multiplication.
- II did 11.1 per cent. better than on first test and 2.2 per cent. poorer than on second test in multiplication.
- I did 36.7 per cent. better than on first test and 7.3 per cent. better than on second test in division.
- II did 11.1 per cent. better than on first test and 2.8 per cent. poorer than on second test in division.
- I did 31.7 per cent. better than on first test and 0.2 per cent. poorer than on second test in total points.
- II did 12.16 per cent. better than on first test and 2.29 per cent. poorer than on second test in total points.
- I did 5.2 per cent. better than on first test and 0.6 per cent. poorer than on second test in first six problems.
- II did 3.7 per cent. poorer than on first test and 1.3 per cent. poorer than on second test in first six problems.

The results of the third test indicated that the superiority of the drill class was maintained over the vacation period. The "period of hibernation" served to increase the speed, while those who had not had the advantage of the drill worked no faster than on the second test. The non-drill section either made no improvement or did worse than on the second test in everything except subtraction.

Drill increased the median 29.2 per cent. and decreased the variability. The data seemed to indicate that drill work operated to equalize the advantages which the arithmetic lessons afforded to pupils of various abilities in computation.

SECOND STUDY.

The tests were given in the sixth grades of three different public-school systems and in the sixth grade of a large private school. The total number of cases recorded in this second study is 222; of these, 110 were boys and 112 were girls. None of the cases reported here is included in the first study.

The three public schools examined are in the Central West. City C has a population of 7000, City M of 12,000, and City D of 30,000. The private school is in New York City.

The conditions under which the tests were given were very similar to those described in the preceding pages. All of the tests were personally conducted by the author. The individual records made on the first test were the basis upon which subsequent attainment was judged. No attempt was made to compare the drill classes directly with the non-drill classes. The object was to determine the improvement made by the drill class upon its previous record and the improvement made by the non-drill class upon its previous record.

In a given class the tests were conducted at the same hour of the school day, in order to eliminate the time factor as far as possible.

This study differs from the preceding study in one important respect. Instead of an interval of 30 recitation periods between the two tests, an interval of only 20 recitation periods occurred between the tests.

Immediately after the first test was given in each school half of the classes examined in each city were given five minutes' drill each day upon the fundamental operations in arithmetic—addition, subtraction, multiplication and division. The first five minutes of the recitation period in arithmetic were devoted to the drill work. The drill was partly oral and partly written, and the time was about evenly distributed among the four operations.

No special instructions were given to the teachers in charge of the drill sections except that they were to emphasize both speed and accuracy in the four operations, and were to cover the same daily assignments in the textbook as the class that had no drill. The teachers of the non-drill classes were asked to give no formal drill upon any of the four fundamental operations during the time that this investigation was in progress. These instructions were carefully observed by the teachers.

The drill classes in each city were able to cover the same subject-matter of the text as the non-drill classes of that city. No special tests were given to determine the comparative excellence of the textbook work, but in every case the teacher in charge of a drill class reported that five minutes devoted to drill work at the beginning of each recitation seemed to act as a mental tonic. It seemed to energize the pupils and to make them keen for the textbook work that was to follow. All teachers of drill classes reported an improvement in textbook work. The writer is not prepared to say whether this improvement was real or imaginary, or, if real, how much of it was directly due to the drill work.

Formal drill work on the four fundamental operations had not been given prior to this investigation in any of the sixth grades examined. Whatever marked changes occurred in all of the drill sections that did not occur in the non-drill sections may reasonably be attributed to the results of the special drill.

This investigation was conducted in the three public-school systems in November and December, 1910, and in the private school in April and May, 1911.

In all of the tables that follow city C will be referred to as C, city M as M, and city D as D. The private school will be referred to as P. The two classes examined in C, in M and in P will be designated as I and II, where I refers to the drill class and II to the non-drill class. In D there were four classes examined. These four classes will be designated as I, II, III, IV. The drill classes in D are I and III; the non-drill classes are II and IV.

All of the tables upon which the following conclusions are based have been placed on file with the department of education of Teachers College.

The age given represents the age to the nearest half-year at the time the first test was given.

A general summary of the results in the combined drill and in the combined non-drill classes will first be given, then a more detailed study of each class and of individual records will be made:

Summary of Complete Data of All Classes Combined—222 Cases.

Summary of Complete Data of All Classes Combined: 222 Cases.

	No. Problems Worked First Test.	Problems Second Test.	Addition First Test.	Addition Second Test.	Subtraction First Test.	Subtraction Second Test.	Multiplication First Test.	Multiplication Second Test.	Division First Test.	Division Second Test.	Totals First Test.	Totals Second Test.	Difference in Totals.	First Six Problems First Test.	First Six Problems Second Test.	Age.
Grand Totals.....	1256	1516	2464	2773	582	713	1899	2236	920	1159	5875	6885	1010	5481	2758	2714
Arith. Average.....	6.14	6.85	11.1	12.06	2.6	3.2	8.55	10.07	4.2	5.2	26.4	31.01	4.53	24.7	25.9	12.2
Per Cent. Gained Av.	11.8	12.7	22.4	17.7	24.6	17.1	26.4	31.01	4.53	5.05						

Summary of Data for Drill and Non-Drill Classes Combined.

Drill Classes Combined: 112 Cases.

	No. Problems Worked First Test.	Problems Second Test.	Addition First Test.	Addition Second Test.	Subtraction First Test.	Subtraction Second Test.	Multiplication First Test.	Multiplication Second Test.	Division First Test.	Division Second Test.	Totals First Test.	Totals Second Test.	Difference in Totals.	First Six Problems First Test.	First Six Problems Second Test.	Age.
Grand Totals.....	690	807	1241	1471	306	404	977	1213	485	651	3009	3739	730	2789	3117	1369
Arith. Average.....	6.1	7.2	11.08	13.1	2.7	3.5	8.7	100.8	4.3	5.8	26.6	33.3	6.5	24.8	27.8	12.2
Per Cent. Gained Av.	16.9	18.5	32.0	24.1	34.2	24.2	24.2	33.3	11.7							

Non-Drill Classes Combined: 110 Cases.

Grand Totals.....	666	709	1223	1307	276	309	922	1023	440	508	2866	3146	280	2692	2641	1345
Arith. Average.....	6.05	6.4	11.1	11.8	2.5	2.8	8.4	9.3	4.0	4.6	26.1	28.6	2.5	24.5	24.0	12.2
Per Cent. Gained Av.	6.4	6.8	11.9	10.9	15.4	9.4								1.8		

In the following "I" indicates the drill classes combined and "II" the non-drill classes combined:

- I did 16.9 per cent. better on second test than on first in number of problems worked.
- II did 6.4 per cent. better on second test than on first in number of problems worked.
- I did 18.5 per cent. better on second test than on first in addition.
- II did 6.8 per cent. better on second test than on first in addition.
- I did 32.0 per cent. better on second test than on first in subtraction.
- III did 11.9 per cent. better on second test than on first in subtraction.

- I did 24.1 per cent. better on second test than on first in multiplication.
- III did 10.9 per cent. better on second test than on first in multiplication.
- I did 34.2 per cent. better on second test than on first in division.
- II did 15.4 per cent. better on second test than on first in division.
- I did 24.2 per cent. better on second test than on first in total number of points.
- II did 9.4 per cent. better on second test than on first in total number of points.
- I did 11.7 per cent. better on second test than on first in first six problems.
- II did -1.8 per cent. better on second test than on first in first six problems.

If the number of problems worked in each test may be taken as a measure of the speed of the pupils, it is seen that the drill class increased its speed by a much larger per cent. than the non-drill class.

Since practically all of the pupils finished at least the first six problems in each test, a comparison of the records made on these six problems will give a basis for determining the relative accuracy. Measured by this standard, the drill class made a gain of 11.7 per cent. in accuracy, whereas the non-drill class actually lost in accuracy (- 1.8 per cent.).

The largest gain made by the drill class was in division, 34.2 per cent., which was more than twice the gain made in division by the non-drill class, 15.4 per cent.

If we compare the gain made by the drill class upon its own record with the gain made by the non-drill class upon its own record, we find that the following results were attained:

- I gained 2.64 times as much as II on number of problems worked.
- I gained 2.72 times as much as II in addition.
- I gained 2.68 times as much as II in subtraction.
- I gained 2.21 times as much as II in multiplication.
- I gained 3.13 times as much as II in division.
- I gained 2.57 times as much as II in total number of points.

The drill classes made from two and one-fifth to three and one-tenth times as much improvement as the non-drill classes. It is worthy of note that the average age in the drill classes was exactly the same as the average age in the non-drill classes, being 12.2 years in each case.

Of the 112 cases in the drill classes, 95 gained in total number of points scored; 5 neither gained nor lost, and 12 lost.

Of the 110 cases in the non-drill classes, 50 gained; 7 neither gained nor lost, and 53 lost.

The largest individual gain made by any pupil in the drill

classes was 46 points. This was made by a pupil with a record of 30 points on the first test. The gain made by this individual over the record of the first test was therefore 253 per cent. The largest gain made by any pupil in the non-drill classes was 19 points. This was made by a pupil with a record of 32 points on the first test. The gain over the record of the first test was 159 per cent.

The average gain in total number of points made by the 95 pupils who gained in the drill classes was 9.8 points, and the median gain was 10 points.

The average gain in total points made by the 50 pupils who gained in the non-drill classes was 5.9 points, and the median gain was 5 points.

The average loss in total number of points made by the 12 pupils who lost in the drill classes was 4.67 points, and the median loss was 4 points.

The average loss in total number of points made by the 53 pupils who lost in the non-drill class was 6.26 points, and the median loss was 6 points.

The greatest loss made by an individual pupil in the drill classes was 13 points, and in the non-drill classes was 17 points. This was a loss of 36 per cent. by the pupil in the drill class and of 54 per cent. by the pupil in the non-drill class.

(To be concluded in the December issue.)

GRADED MENTAL TESTS.

PART III. JUDGMENT, CONCLUSIONS AND SUMMARY OF RESULTS.

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7. *Judgment:*

The final group of tests was designed to measure ability to reason, beginning with concrete situations and ending with a test which required the formulation of a definition for an abstract idea. These tests, with the exception of the definition test, are all modifications of some that have previously been given in the Columbia laboratory.

A. The simplest is the *alternative test*, as follows:

As quickly as you can, make these sentences correct by drawing a line through the wrong word where two words occur.

1. Days are longer in summer than in winter.
shorter

2. Glass breaks more easily than tin.
less

3. Water always flows up hill.
down

4. Iron is softer than wood.
harder

5. Christmas comes before Thanksgiving.
after

6. Cotton clothing is warmer than wool.
cooler

7. More coal is burned in summer than winter.
Less

8. Oranges are ^{more} sweet than lemons.
less
9. The sun shines ^{more} brightly than the moon.
less
10. Walking is ^{more} tiresome than running.
less
11. The sun rises ^{earlier} in January than in July.
later
12. Anything that floats is ^{heavier} than water.
lighter
13. Plants grow ^{more} readily in warm sunshine than in the cool shade.
less
14. January is ^{longer} than February.
shorter
15. A square yard is ^{greater} than ten square feet.
less

The first ten alternatives were given to the sixth, seventh, eighth and ninth year groups. For the remaining four groups the five additional alternatives were appended. With the sixth and seventh year groups the alternatives were given orally. In the main, they are the same as used by Bonser, but our determination to present no problems depending for their solution upon knowledge gained at school made it necessary to rule out some of Bonser's alternatives and add others. In the fifteenth alternative we were not as fortunate in ruling out school training as we had been with the others, since children's experience with square measure seems to have been limited to the schoolroom. As these alternatives present but two possibilities, one of which is bound to be right, and as the experiences involved were familiar to the youngest child, the ability to judge correctly was manifested to a very high degree in the youngest group.

TABLE XVI.
Alternative Test.

Group Age.	<i>Unretarded.</i>		<i>Retarded.</i>	
	Av. No. Errors.	M. V.	Av. No. Errors.	M. V.
6	1.5	.9	...	...
7	0.9	.7	...	...
8	1.0	.8	1.0	1.0
9	0.5	.6	1.3	0.4
10	1.1*	.9	5.0	0.0
11	1.0†	.3	1.4	0.8
12	0.2‡	...	0.6	0.3
13	0.3‡	...	0.3	...

*Four of the errors made were on the square yard alternative; if we excluded that the average error is only .6.

†Exclusion of the square yard alternative here would bring the average error to .3.

‡These errors are all due to the square yard alternative.

*B. Bonser's test of selective judgment*¹ presents the next stage of difficulty. In order to confine this test to an experimental basis, we retained the form and general method of Bonser's test, but used other data. The following is the text of the test as we gave it:

The following reasons have been given to show why grass grows in summer and not in winter. Write "yes" after those reasons you consider good and "no" after the reasons you think poor.

1. Summer is warm and winter is cold.
2. Grass is green.
3. Grass needs warmth.
4. Grass needs sunshine.
5. Cows and horses eat grass.
6. Grass needs moisture.
7. The ground is frozen in winter.
8. Children skate in winter.
9. Grass is sometimes cut for hay.
10. Grass could not grow in the frozen earth.

I made one other deviation from Bonser's method, in that I asked the pupil, before he began his test, why grass did not grow in the winter where it grew in summer. His answer was written at the top of the sheet, which was then handed the child for his own record. In this previous formulation of his

¹F. G. BONSER. *The Reasoning Ability of Children of the Fourth, Fifth and Sixth School Grades*. Contributions to Education. Teachers College, No. 37, 1910, p. 6.

reason he made explicit the general principle which should be his determinant as to the relevancy or irrelevancy of the statements given. There remained, then, in each selective act two other steps: first, the comparison of each reason with the general principle which he had already stated, and secondly, the selection or rejection of each of these statements on the basis of their relevancy to the general principle. With the three youngest groups the test was given orally and their answers recorded on the text. This made the test about equally difficult, so far as form is concerned, for all the groups.

Four of the statements are irrelevant. Are they judged so? To show distribution of errors we have divided them (Table XVII) into errors of assent and of dissent. As can be readily

TABLE XVII.

Selective Judgment.

Group Age.	<i>Unretarded.</i>		<i>Retarded.</i>	
	Average of Assent.	Errors of Dissent.	Average of Assent.	Errors of Dissent.
6	3.5	...	...	...
7	1.7	.4	...	...
8	1.3	.8	4.0	1.5
9	2.1	.1	3.3	0.3
10	1.1	.1	4.0	...
11	1.0	...	2.0	1.0
12	0.0	.0	0.8	...
13	0.3	.1	1.0	0.3

seen, the average number of errors due to suggestion outnumber the other failures in judgment. Three stages in the development of independent judgment are readily discovered: (1) Assent to all suggestions, illustrated by the reactions of the majority of the sixth and seventh year groups; (2) a realization that there are other possibilities than those suggested. Conflict arises here, but no clear comparison of major and minor premises; (3) a careful and considerate deliberation upon the terms of the problem.

The errors made in this test were due either to inadequacy of the general principle or failure to relate the minor premises to this general principle.

C. Problem-questions. Five problems previously used in the Columbia tests were given to the four oldest groups. The following are the problems:

1. A boy said: "I know ten good men who are doctors and ten bad men who are policemen. So the doctors are better than policemen." Did he prove it? Why? or Why not?
2. If all the boys who are good in arithmetic are good in spelling, will all the boys who are good in spelling be good in arithmetic? Why? or Why not?
3. If there were no bread or flour, would everyone starve?
4. Is this true, "The more we eat the more we grow?"
5. If there were no schools, would children learn anything?

These seemed better tests of reasoning than any of the problem-questions given in the Binet-Simon series.

The replies were classed as 'complete failures' if the child did not give the right answer. If the correct answer was given without a reason or with an insufficient reason, it was classed as an 'intuitive judgment.' Finally, if the reason given showed a clear perception of the problem, it was classed as a 'reasoned judgment.'

TABLE XVIII.
Problem-Questions. (Reasoning.)

Group Age.	1st Question.			2nd Question.			3rd Question.			4th Question.			5th Question.		
	C.F.	I.J.	R.J.	C.F.	I.J.	R.J.	C.F.	I.J.	R.J.	C.F.	I.J.	R.J.	C.F.	I.J.	R.J.
10	7	2	..	5	4	..	6	2	1	7	2	..	4	2	3
11	2	2	1	..	5	..	2	2	1	2	2	1	2	2	1
12	..	..	6	2	4	..	1	2	3	1	2	3	1	2	3
13	1	..	6	..	4	2	1	3	3	1	6	..	..	1	6
<i>Unretarded.</i>															
10	1	..	..	1	..	..	1	..	..	1	..	..	..	..	..
11	4	1	..	3	2	..	2	2	1	2	2	1	..	..	..
12	3	1	..	1	2	1	1	3	..	1	3	..	..	..	..
13	..	..	3	..	3	..	..	3	..	..	3	..	..	..	..
<i>Retarded.</i>															

C. F.=Complete Failure. I. J.=Intuitive Judgment. R. J.=Reasoned Judgment.

The percentage of reasoned judgments was greater in the case of the first problem. The answer was generally given in some such form as this: "There are more than ten doctors and ten policemen. Ten cases could not prove the truth for all." Even in the narrow range from the tenth to the thirteenth year the growth of reasoning power is marked. In the tenth year, when the child is susceptible to the affirmative suggestion, replies were frequently couched in terms suggested by the question. In the eleventh year there is a large percentage of intuitive judgments: the child has begun to think independently, but without clear formulation of his problem. The twelfth and thirteenth years show a large proportion of reasoned judgments.

D. Definition test. The definition tests which were given by Binet were not arranged in serial form. It seemed to us that such an arrangement would afford the best opportunity to study the development of the ability to form concepts. The terms to be defined were grouped in five pairs, as follows: (1) *Key* and *chair*, (2) *sweet* and *hot*, (3) *kindness* and *pleasure*, (4) *to read* and *to write*, (5) *time* and *number*. The order would perhaps be better had the third and fourth pairs exchanged places in the series.

The results of this test are rather difficult to tabulate, because of the variety of forms in which the definitions were cast. We decided upon three general categories: first, complete failure; secondly, partial definition (all fairly successful attempts, such as definition by use or by illustration or in terms of opposites), and thirdly, adequate definition (clear and complete concepts). Answers that repeated the word to be defined were classed as failures. Such replies as "To read! Why, to read is to read!" were not infrequent among the younger groups.

Adequate definitions were not given, except sporadically, before the eleventh year; even then very few appear. *Kindness* and *pleasure* seem more difficult to define than *to read* and *to write*. On the whole, it seems harder for the child to abstract the essential characteristics and to formulate definitions for the more familiar experiences than it is for him to define adequately a term which has always been more or less

TABLE XIX.

Ability to Define.

Group Age.	1st Pair.			2nd Pair.			3rd Pair.			4th Pair.			5th Pair.		
	C.F.	P.D.	A.D.	C.F.	P.D.	A.D.	C.F.	P.D.	A.D.	C.F.	P.D.	A.D.	C.F.	P.D.	A.D.
6	7	13	..	10	10	..	8	12	..	12	8	..	19	1	..
7	..	20	..	8	12	..	7	13	..	10	10	..	10	10	..
8	..	16	..	4	12	..	6	10	..	6	10	..	8	8	..
9	..	16	..	4	12	..	7	9	..	9	7	..	6	8	2
10	..	12	6	4	14	..	8	10	..	4	10	4	4	12	2
11	..	10	..	..	8	2	..	10	..	1	8	1	..	8	2
12	..	7	9	..	12	4	4	12	..	..	8	8	..	9	7
13	..	10	4	..	9	5	..	14	..	..	5	9	..	7	7
<i>Retarded.</i>															
8	2	2	..	2	2	..	4	..	..	4	..	..	4	..	..
9	..	4	..	1	3	..	..	4	..	3	1	..	..	4	..
10	..	2	..	1	1	..	2	..	..	2	..	..	2	..	..
11	..	10	..	3	7	..	1	9	..	4	6	..	2	8	..
12	..	8	..	2	6	..	..	8	..	2	6	..	2	8	..
13	..	4	2	1	4	1	2	4	..	3	3	..	..	6	..

C. F.=Complete Failure. P. D.=Partial Definition. A. D.=Adequate Definition.

of an abstraction to him. The terms *to read, to write, time* and *number* furnished the best illustrations of the growth of the concept-forming power. Here is an illustration of an adequate definition given by a twelve-year-old boy: "To read is to translate a thought from marks on paper to yourself or to someone else." The most frequent definitions given by the younger groups for this term were similar in form to the one previously quoted as an illustration of a complete failure.

CONCLUSIONS.

1. *Value for diagnosis:* In order to determine the value of the tests for diagnostic purposes, it was agreed that prior to the tests neither supervisors nor teachers should give the experimenter any hints as to their experience with the individuals tested. When the tests were completed in a department, I discussed their outcome with the teachers. My results in every case bore out the experience of the teachers, and often threw light on difficulties that had been encountered when dealing with the more difficult cases in regular class work.

2. *Value as mental norms:* The initial question as to the possibility and practicability of the establishment of reliable intelligence-norms, graded by years, which might be substituted for the time-honored examination on subject-matter taught in schools is answered in the affirmative. There is a striking parallelism between growth of intelligence and age shown in the results obtained from the unretarded group. The differences in achievement from year to year were not large, but they were regular, while the two decided leaps in ability shown with advance from the primary stage to the intermediate and from the intermediate to the grammar grade were as surprising as they were interesting and confirmatory of the general theory.

3. *Limitations:* The number of children tested was too small to be made the basis of sweeping generalizations. There were only eighty children in all, ten for each group; of these eighty, fifteen were found upon closer examination of all their school records to belong to the retarded class. So the conclusions are drawn from sixty-five cases. These sixty-five

cases, however, were tested individually, and the results obtained from them are more reliable than from a much larger number of cases tested in groups.

It is desirable that the tests be repeated with more children. The tests should be given individually and to unretarded children only. Reliable norms can be obtained only by standardizing results from the unretarded or typical cases. Tests made at random upon unselected children will only give random results.

4. *Comparative value of tests:* While as a whole the tests proved satisfactory, the learning tests were inadequate—another test should be added to complete the series. The linguistic tests of constructive ability were more valuable than the mechanical, since in the first case it was possible to follow the complete course of the experiment, while in the second case the judgment as to degree of success was more largely based upon final results. Of the judgment tests, the series of definitions reveals the progress in intelligence much more clearly and definitely than do the other tests. Throughout the tests quality of work done rather than the time consumed proved the most reliable measure of intelligence.

SUMMARY OF RESULTS TO SHOW AGE-NORMS.

This summary shows the age-norms for each test as indicated by the results obtained from the unretarded groups.

Sixth Year.

Degree of attention: Not more than 10 or 11 omissions in cancelling a's, Series II.

Perception: Actual perception-time for a-test not above 175 sec., even with slower children.

Comprehension (ability to comprehend a situation): Elements of a picture are not unified. Discrimination does not involve more than objects of sense-perception.

Memory Span. Pictures: Recall five to seven of 20 pictured objects.

Sentences: Repeat without error first seven or eight of Whipple's arrangement of the Binet sentences.

Association (opposites): Average 10.5 associations with the Bonser set of opposites, at an average rate of 150 to 160 sec. per set.

Learning: Dissected Maltese Cross and its numerals associated in 3 or 4 repetitions.

Construction and Invention.

Mechanical: Solve the first and second divided rectangle puzzle, and possibly also the Terman puzzle.

Linguistic: Cannot build words from letters. Can give orally sentences containing the three words: *boy*, *river* and *ball*.

Judgment.

Alternatives: Choose the correct alternative in about eight of ten cases.

Selective judgment: Fail.

Definitions: May define common objects in terms of use.

Seventh Year.

Degree of attention: Not more than 10 or 11 omissions in cancelling a's in Series II.

Perception: Actual perception-time in Series II a-test not above 80 to 90 sec.

Comprehension: Describe a picture, but fail if asked to give a terse title. Questions are either irrelevant or concerned with some minor object of the picture.

Memory Span. Pictures: Six or seven objects.

Sentences: Repeat without error the first eight or nine sentences in Whipple's list.

Association (opposites): Average 14 correct associations for the three sets of opposites, at an average rate of 140 sec. per set.

Learning: (a) Maltese Cross test with two repetitions. (b) Colored forms test in 3 or 4 repetitions.

Construction and invention.

Mechanical: Solve all three rectangle puzzles; also, usually understand and solve the Terman puzzle.

Linguistic.

(1) Word-building: Build 5 or 6 words with the 6 letters.

(2) Sentence-building: Construct oral sentences containing the 3 words, and even form them into a narrative.

Judgment.

Alternatives: Choose correct alternatives in nine out of ten cases.

Selective judgment: Governed largely by affirmative suggestion.

Definitions: Give partial definitions in about 50 per cent. of cases.

Eighth Year.

Degree of attention: Not more than 3 or 4 omissions (5 at most) in the a-test, Series II.

Perception: Perception-time in a-test, Series II, not over 60 sec.

Comprehension: Unify picture in terms of action of principal object. Give superficial title. Questions concern minor or irrelevant points.

Memory Span. Pictures: Nine to ten objects.

Sentences: Repeat the first nine, or at best eleven sentences.

Association (opposites): Average of sixteen correct associations in the three sets at an average rate of 110 sec. per set.

Learning: (a) Maltese Cross test in 2 or 3 repetitions. (b) Colored forms test in 3 or 4 repetitions.

Construction and invention.

Mechanical: No. 1 of divided rectangular puzzles need no longer be given. Solve second and third, the latter within 4 min.

(2) Terman puzzle: Successful.

(3) Clock-face: From 50 per cent. to 70 per cent. succeed.

Linguistic.

(1) Word-building: Five to ten words in 5 min.

(2) Sentence-building: Complete narratives on a theme suggested by the three words.

(3) Ebbinghaus Completion Test: Not more than 50 per cent. of normal eight-year old children attempt the Ebbinghaus test, using story: "Where the Dandelions Went," as given by Whipple.

Judgment.

Alternatives: Average of 1 or 2 errors.

Selective judgment: Exercise some independent judgment.

Errors of dissent about equal to those of assent.

Definitions: Definitions are still in terms of use or of opposites. Not able to formulate clear concepts.

Ninth Year.

Degree of attention: Not more than 5 errors in a-test.

Perception: Perception-time not more than 1 min.

Comprehension: Titles given have a certain superficial unity of descriptive phrase or action or are in terms of some attribute of the principal object. In 9 of 10 cases questions refer to some irrelevant or minor aspect.

Memory Span. Pictures: From 6 to 12 objects.

Sentences: From 8 to 13 sentences (Whipple's arrangement).

Association (opposites): Average of 17 correct associations for the three series, at a rate of a little over 100 sec. per series.

Learning: (a) Maltese Cross test with not more than two repetitions. (b) Colored forms test with not more than 4 repetitions.

Construction and invention.

Mechanical: (1) Solve the second and third divided rectangle puzzle readily.

(2) Terman puzzle solved with little hesitancy.

(3) About 70 per cent. interchange hands of clock by dividing the problem into two steps; a larger percentage makes the first step successfully.

Linguistic. (1) Word-building: Build 5 to 14 words in 5 min.

(2) Sentence-building: Nearly all invent a narrative for the words. Story is of realistic type.

(3) Completion Test: Complete the Dandelion story and get meaning with not more than 35 errors.

Judgment.

Alternatives: Correct alternatives for all 10 sentences.

Selective judgment: No gain in ability over 8-year child.

Definitions: Define in terms of use.

Tenth Year.

Degree of attention: Not more than 3 or 4, or at most 5, errors.

Perception: Time within 1 min.

Comprehension: About same as for ninth year. Number of questions concerning essentials increased to nearly one-fourth of total asked. Irrelevant questions greatly diminished.

Memory Span. Pictures: From 6 to 12.

Sentences: Repeat correctly 9 to 14.

Association (opposites): Average at least 17 correct of each 20 in less than 90 sec.

Learning: (a) Maltese Cross test with 2 repetitions.

(b) Colored forms test with 2 or 3 repetitions.

Construction and invention.

Mechanical. (1) Puzzles: Solve the second readily and the third in less than 3 min.

(2) Terman puzzle: Complete success.

(3) Clock-face: Eighty per cent. succeed.

Linguistic. (1) Word-building: Build 8 to 17 words.

(2) Sentence-building: Complete narratives.

(3) Completion test: Dandelion story completed with an average of 15 errors.

Judgment.

Alternatives: Not more than 2 errors in 15 alternatives.

Selective judgment: Begin to discriminate between relevant and irrelevant statements.

Definitions: In 90 per cent. definitions are still inadequate.

Problem-question: A very small percentage of correct answers are given to questions involving reasoning.

Eleventh Year.

Degree of attention: Not more than 3 or 4 errors in the a-test.

Perception: No gain over tenth year.

Comprehension: A fair proportion of titles show comprehension of artist's meaning. Ability to question shows little advance over tenth year.

Memory Span. Pictures: From 8 to 15 objects.

Sentences: From 10 to 13 repeated correctly.

Association (opposites): Average 19 correct in less than 90 sec.

Learning: (a) As tenth year.

(b) Colored forms test with not more than 2 repetitions.

Construction and invention.

Mechanical. (1) Puzzles: Solve rectangle puzzles, the third within 3 min.

(2) Terman puzzle: Solved readily, need not be given later.

(3) Clock-face: Solved in two steps.

(4) Binet cut design: Solved correctly by 65 per cent.

Linguistic.

(1) Word-building: As in tenth year.

(2) Sentence-building: As in tenth year.

(3) Completion test: Dandelion story reconstructed with from 3 to 9 errors.

Judgment.

Alternatives: Average 1.5 errors.

Selective judgment: Discriminate between relevant and irrelevant statements.

Definitions: A few can give adequate, but most only partial definitions.

Problem-questions: About one-third the pupils give a reasoned answer.

Twelfth Year.

Degree of attention: An average of not more than one error in the a-test.

Perception: Time 40 to 50 sec.

Comprehension: Majority of titles are completely unified, though concerned with superficial aspect. A fair percentage of questions involve essentials.

Memory Span. Pictures: From 8 to 10, with average above 11.

Sentences: From 11 to 16.

Association (opposites): Average 19 correct in less than 80 sec.

Learning: (a) Maltese Cross associations learned with one exposure.

(b) Colored forms associations with two repetitions, as in eleventh year.

Construction and invention.

Mechanical. (1) Third puzzle in approximately 1 min.

(2) Clock-face: Solved in one step.

(3) Binet cut design: Correctly drawn by 70 to 80 per cent.

Linguistic. (1) Word-building: Build 11 to 17 words.

(2) Sentence-building: As in tenth year.

(3) Completion test: Dandelion story completed with 1 to 11 errors.

Judgment.

Alternatives: Not more than 2 errors.

Selective judgment: No errors.

Definitions: Nearly 50 per cent. of definitions adequate.

Problem-questions: About 50 per cent. of problem-questions are well reasoned.

Thirteenth Year.

Degree of attention: Less than one error for the a-test.

Perception: Time as in twelfth year.

Comprehension: Show grasp of real significance of pictures.

Over 50 per cent. of questions deal with essentials.

Memory Span. Pictures: As in twelfth year.

Sentences: As in twelfth year.

Association (opposites): Average 19 correct in 60 sec.

Learning: (a) As in twelfth year.

(b) As in eleventh and twelfth years.

Construction and invention.

Mechanical.

(1) Third puzzle: Solved in a minute and a half.

(2) Clock-face: Solved in one step.

(3) Cut design: Correctly drawn by 80 per cent.

Linguistic.

(1) Word-building: Maximum 17 words.

(2) Sentence-building: As in tenth year.

(3) Completion test: Dandelion story completed with 3 to 12 errors.

Judgment.

Alternatives: Not more than 3 errors.

Selective judgment: No errors.

Definitions: More than half the definitions are adequate.

Problem-questions: More than half the answers are carefully reasoned conclusions.

THE CHILD'S SPEECH.

II. THE MOTHER'S TONGUE.

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1. The rudest provision which living creatures make for their young is the supply of food. In certain low forms this is the only recognition which the offspring receives. Among the higher organic types arise personal care and protection against danger, but this is at first a simple instinctive reaction and commonly of short persistence. In human life a third element is added which raises man incomparably above his fellows. This is membership in a community, which is mediated by the possession of speech. The mental solitude in which beasts live is inconceivable to men, because they have always been participants in a spiritual culture. The traditional dogma that the individual antedates society is wholly untenable. An organized group awaits the birth of each human child and at once receives him into its care. The infant finds himself a member of a trinity—father, mother and child. It is the common life of the social group which molds as well as nourishes him, and upon its vital atmosphere he is continuously dependent so long as he lives.

2. Within this community one member is of unique importance. The mother is the fountain and center of the child's life. She gives the babe food, she relieves him of pain and comforts him, she quiets him when disturbed, and is a playmate during his happy hours. Spiritually as well as materially the child's existence revolves about that of the mother, and everything connected with her person, receiving significance through its associations, is loved and prized by him.

Among the qualities which the child associates with his mother's presence the voice is pre-eminent, for it symbolizes

as perhaps nothing else can the intimate and manifold relations which ally them. The voice radiates farther than any other attribute the mother possesses. It assures the child of her nearness in the dark and runs before her as she approaches his room. It is not their only bond; many other things, because they help to establish a strong and tender connection between the two lives, become part of this ideal complex in the child's imagination—the affectionate glance which dwells on him long and lovingly, the soothing and caressing touch, the strong hands always ready to bear him up—nevertheless the voice swiftly becomes the most intimate and thrilling medium between their two spirits, before speech as such has attained any significance.

Thus out of the elementary relation of mother and offspring arises the early and profound influence of the voice upon the child. It is the first personal bond which is established between him and the world. The voice appears as a beneficent power, cheering, comforting, consoling—at once a solace and a delight. Above all, its perpetual song is an activity into which the child himself can enter. It is not a mere identifying mark of the mother's presence, objective and inimitable, to be recognized or dwelt on in imagination; it is a possession which the child shares with the mother, and through it her spirit increasingly penetrates his life and becomes a part of his own personality.

Such participation in the activities of others is the characteristic form of evolution in the individual self at large. Through it comes all later sense of community and upon its existence rests the very structure of society itself. This sympathetic interpretation of other lives receives its first clear embodiment through the medium of the voice, which gives mother and child community in the spiritual world.

3. The power thus to reproduce the tones of his mother's voice, and so not only to respond to her approaches, but also to supplement her presence, affords the child keen delight and soon becomes a solace to which he has constant recourse. What is so intimately connected with the presence of the loved one—song, speech, laughter—he can reproduce through his own activity. It is not only taken over from the objective

world into himself, but is voluntarily reproducible at any moment, and the delight which the child has in hearing the speech of his mother is continued during her absence in consequence of this use to which his own voice can be put. The pleasure which the young child takes in cooing and babbling is in part referable to the associations of these sounds with the comforting presence of his mother. Love and activity are the twin sources of his early delight in the voice and of his constant employment of it before the actual imitation and use of articulate speech-forms has been begun.

Throughout the child's experience the tones of the human voice are knit up with care for his wants, with relief of his pain and with participation in his pleasures. The mother's fondling as well as her tendance issues in speech—in crooning and lullaby, in soft whispers and hushing sounds, in bright and happy song, in sympathetic and pacifying words. In distress the child turns to it for comfort; when he has been left alone, it is the earliest signal of his mother's return; no occasion in the daily routine of experience is complete without it. Everywhere speech looms large in the happy associations of the child's world, and in literal truth he can now scarcely be happy unless his mood be ratified by the mother's voice.

The sound of the voice, loved and prized for its associations, becomes a constant recourse of the child. He is happy in its use as well as in hearing it. Laughing, cooing and babbling, which are called the natural and universal expressions of a joyful mood, take on a new value from their happy associations. The use of the voice is no longer merely the reflection of a mood independently originated; it has become the medium by which a happy mood is established. Its employment in a sort of wild music now constitutes a conscious part of the child's means to happiness, and he gives it incessant practice. His life becomes an echo of the mother's speech, faithful through all its shortcomings in its reflection of hers. There you may catch her tones and inflections, her laughter and whisper, even the very melody of her speech repeated.

4. It is this fine though unconscious faithfulness of the child to the model he imitates which makes good speech in the home imperative. The vice of impoverished utterance, into

which most of us have fallen, arises not so much from a defect of school training as from unhealthy home surroundings, in which the thought of the child is cramped and his feeling allowed to stagnate through the lack of a rich and flexible medium of expression. It is in the intimate life and conversation of the family circle that the child not only acquires the rudiments of speech, but also receives his first impressions, unconscious but lasting, of its values and beauty. As a vigorous intellectual activity can be stimulated and sustained only in the medium of a highly cultured speech, so can the ear be tuned and a sense for fit and noble diction fostered only where good speech is prized and daily striven after.

In all great and vital literature the child will find such stimulation and discipline, but his independent approach to this source of training comes only at a later period, when the example of home usage has already had its effect for good or ill. When that epoch is reached the child should find himself already at home with the spirit of good writing and possessed of that bias in its favor which only hourly contact can give.

For this illuminating and refining contact with good speech the child should be indebted to his home environment. Long before he can choose and read for himself, even before he is acquainted with his letters, he should know much that has a place in this high field. The great stories and noble poems of every literature are written in words so simple that a child can understand them, and his first acquaintance with the songs and tales of his own people should be made in the nursery as he listens at his mother's knee.

5. In this phase of the child's development it is not chiefly a question of vocabulary, nor even of grammar, though from the beginning a flexible vehicle and good usage are important. It is the quality of voice and articulation which are now most subject to modification. The organs of speech grow to the mode in which they are exercised, and the development of that multitude of defects which commonly marks the later voice receives its first stimulus in infancy from the harsh and slovenly speech which the child hears about him.

In the period just preceding intelligent speech the voice is near the height of its plasticity. It has developed a wide

range of modulations, in force, inflection, and even tone, of which more generous and spontaneous use is made than perhaps at any later date. It is extraordinarily sensitive to modifying influences and eagerly engaged in extending its own activities. The child delights in sounds, and imitates all kinds of noises, incessantly repeating, varying and combining them. In this imitative and experimental process the voice is taking shape, though it is still far from any condition of finality, and its range of tones, richness of modulation and general compass and flexibility as a medium of speech are receiving their first determination. That long process has already begun which is necessary to bring any human voice to its full perfection as an instrument of musical and expressive speech. In its earliest stages this development is unreflective and unsystematic. The child aims at no ideal end, nor is any technical voice training afforded him. Unconsciously, by daily and hourly contact, the quality of the voices he hears and the use to which they are put are molding his speech in vocal character and inflection as really as in vocabulary and pronunciation. If these voices are harsh and thin, his will lose something of its natural sweetness; if they are strident from long abuse, his will become coarsened through reflex strain; if they are stiff and lack dramatic variety, those subtle modulations of the young voice in which lies much of its charm will be gradually subdued to the dominant monotony.

The question is not one of teaching, but of habit and ideal. No formal instruction nor even stated drill will offset the effect of perpetually repeated example. The habits of speech prevalent within the family are the most potent factor in molding, for better or worse, the child's conception and use of language.

6. The forms of speech which daily intercourse presents to the child are abundant and varied. The mother tongue is whispered and murmured, crooned and sung to him. It appeals directly to his attention in all his occupations and forms a part of every response to his needs. It is heard in the common intercourse of the family circle when not directed to him as an individual. It reflects every shade of feeling on the part of those who use it, and presents manifold variations on the

lips of father, mother, brother and sister—in pitch, volume, timbre, rate and dramatic inflection. The child has the whole range of terms which family discourse comprises set before him, and the interest which attaches to the situations in connection with which speech is used stimulates a close attention to it.

The training in speech is thus no intermittent process, but one which is renewed day by day and hour by hour in the life of the child. Language is the spiritual medium in which he lives and moves from the outset of life.

7. In his attempts to master this medium needless difficulties should not be set in the child's way. For its slovenly and impoverished speech, it may be said, the family is not responsible. The habit is a social inheritance fixed by early example and training which the parents cannot now alter. But the older members of the home circle often seem to go out of their way to interpose obstacles to the child's progress in the use of normal human speech. Each word in any language is a precise sound-form which is mastered most quickly when it is presented without variation in form. In his attempts to pronounce the words of his mother tongue the child inevitably introduces modifications in these sound-forms because of the imperfection of his own organs and the inherent difficulty of the movements which their production involves. But the process of learning cannot be simplified by interposing a system of modified word-forms for the child to imitate, no matter how much easier they may be than the words they replace. The impulse which leads the mother to transform the words of her speech into baby-talk is at best the reflection of an absurdly misguided logic. It is these precise word-forms which must be mastered in the end, and every such procedure is a psychological complication which the child should not have to endure. So far as understanding is concerned, the simplification is uncalled for. The child apprehends the mother's speech, and it is the words as she utters them which he is trying to reproduce. As for articulation, it merely confuses the child and distracts attention from his true aim. In so far as the substitution is successful the task of learning to speak, instead of being lessened, is simply doubled and the child's

progress sensibly delayed. In most cases, indeed, no great harm may be done by baby-talk, but its use is always an unwise concession to the mother's weakness, and in exceptional cases its employment has proved disastrous in fixing the child's physiological stammering as an obstinate habit of speech. The child has a right to the best that home speech can offer, in purity of form no less than in richness of cultural content.

The double significance which human speech possesses, both as the instrument of all future intellectual activity and as the medium of human intercourse at large, makes every phase of its development in the individual a subject of interest to the student no less than of importance to the teacher. The earliest stage in this formal evolution will be taken up in the next paper of this series.

(To be continued.)

THE WRITING ABILITIES OF THE ELEMENTARY AND GRAMMAR SCHOOL PUPILS OF A CITY SCHOOL SYSTEM MEASURED BY THE AYRES SCALE.

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In connection with the preparation of both the Thorndike and the Ayres scales for the measurement of handwriting it has been frequently stated that one of the values of such standards would lie in their furnishing a means of comparing the writing abilities of children of different ages, grades, schools and cities.

In the following study the attempt was made to apply the Ayres scale to the writing of all grammar and elementary school children of a small city school system, with reference to determining the age, grade and school variations in legibility of handwriting. It was thought that such a study would be a valuable test of the practicability of the scale itself.

If all samples of writing were judged by the same person without reference to age or grade, and the resulting grades showed a definite progression in these two particulars, it would seem to indicate that the scale is really workable. The object was then to compare grade with grade, age with age, and school with school. It was thought possible that the resulting grades might throw some light (1) upon the relative efficiency of the writing supervision in the different schools, and (2) upon the question as to whether increase in writing ability by both age and grade is continuous.

One set of 34 samples was graded independently by eight persons to determine how far the rankings of different judges will tend to vary. The results of this part of the study throw

some light upon the extent to which the scale furnishes a real objective measure of writing ability.

The material for the study was secured by having the teachers hand out to the children at the regular writing period slips of paper with a typewritten sentence at the top. The pupils were asked to copy the sentence in their ordinary hand, *i. e.*, as they commonly wrote day by day. In this way we secured 966 specimens from the 1st to the 8th grades, ages from 6 to 17 years.

The Scale.—The grades on the Ayres scale are supposed to represent eight equal steps from very poor to very good writing. These steps are designated by 20, 30—90. Under each grade three specimens of writing are given—vertical, medium slant and full slant. The grade 20 represents very poor writing, while the other end of the scale, 90, represents a degree of excellence seldom attained in the public schools. To grade a specimen one is instructed to slide it along the scale until “a writing of corresponding quality is found.”

Grading.—This is naturally a difficult task, in spite of the excellence of the scale. It is impossible to eliminate altogether the subjective element in judging of the merit of the samples. This is proved in part by the fact that competent judges are bound to vary somewhat in their rankings of the same specimens. The range of this variation will be discussed in a later paragraph. Another subjective difficulty which is even more serious is the inability of a single judge to be entirely consistent even at a single sitting. Try as he may, he is apt to rank a very good specimen too high if it follows immediately after a very poor one. It would no doubt have been better if all the specimens could have been tentatively arranged in eight groups according to the grades of the scale, and then all the samples of each grade should have been compared with reference to the standard samples of that grade in the scale. In this way a single judge could obtain a more accurate rank for each specimen than when each sample is measured as far as possible by applying it by itself to the scale.

In determining the ranks of these 966 specimens the judge did not, as far as he was aware, pay any attention to or think of the age or grade of the child.

There are six elementary schools in the system and one grammar school, which are here designated A, B, C, D, E, F, and Grammar, respectively.

SCHOOL A. (First Ward.)

Grade.	No. in Grade.	Average Rank of Grade.	Average Deviation.	Deviations of Various Grades from School Average.
1 A	26	23.	6.4	—18.
2 B	5	36.	7.2	— 5.
2 A	12	30.	4.0	—11.
3 B	10	38.	8.4	— 3.
3 A	14	42.	7.9	1.
4 B	7	47.	6.1	6.
4 A	8	48.	7.4	7.
5 B	16	45.	5.6	4.
5 A	6	51.	8.3	10.
6 B	13	50.	7.2	9.

Average Grade for School A, 41.

SCHOOL B. (Second Ward.)

Grade.	No. in Grade.	Average Rank of Grade.	Average Indiv. Deviation.	Deviations of Various Grades from School Average.
1 A	16	36.	8.0	—4.
2 B	16	36.	5.5	—4.
2 A	4	35.	5.0	—5.
3 B	9	40.	8.8	0.
3 A	13	41.	5.7	1.
4 B	12	44.	6.6	4.
4 A	14	43.	7.5	3.
5 B	30	44.	5.7	4.
5 A	26	44.	6.7	4.

Average Rank of School B, 40.

SCHOOL C. (Third Ward.)

Grade.	No. in Grade.	Average Rank of Grade.	Average Indiv. Variation.	Deviations of Various Grades from School Average.
2 B	9	41.	5.9	—4.
2 A	12	47.	3.8	2.
3 B	12	45.	4.6	0.
3 A	13	52.	4.7	7.
4 B	11	49.	5.	4.
4 A	15	52.	3.2	7.
5 B	18	42.	7.1	—3.
5 A	20	47.	5.5	2.
6 B	17	39.	5.6	—8.
6 A	13	44.	5.8	—1.
7 B	17	44.	6.7	—1.
7 A	12	45.	6.5	—0.

Average Rank of School C, 45.

Average Rank of Grades 2 B-5 A, Inclusive, 46 +.

SCHOOL D. (Fourth Ward.)

Grade.	No. in Grade.	Average Rank of Grade.	Deviations of Various	
			Average Indiv. Variation.	Grades from School Average,
1 A	4	20.	.0	—20.
2 B	10	27.	7.0	—13.
2 A	17	35.	10.3	— 5.
3 B	18	41.	7.0	1.
3 A	4	42.	7.5	2.
4 B	13	49.	5.6	9.
4 A	22	46.	7.2	6.

Average Rank of School D, 40.

SCHOOL E. (Kirkwood.)

Grade.	No. in Grade.	Average Rank of Grade.	Deviations of Various	
			Average Indiv. Variation.	Grades from School Average,
1 A	8	23.	3.7	—14.
2 B	4	40.	0.0	— 3.
2 A	9	37.	3.5	0.
3 B	8	42.	7.5	5.
3 A	7	38.	4.9	1.
4 B	7	41.	4.9	4.

Average Rank of School E, 37.

SCHOOL F. (Shimek.)

Grade.	No. in Grade.	Average Rank of Grade.	Deviations of Various	
			Average Indiv. Variation.	Grades from School Average,
2 B	7	27.	4.1	—14.
2 A	2	35.	5.	— 6.
3 B	3	36.	4.5	— 5.
3 A	5	44.	4.8	3.
4 B	7	44.	4.9	3.
4 A	1	60.	0.0	19.

Average Rank of School F, 41.

GRAMMAR SCHOOL.

Grade.	No. in Grade.	Average Rank of Grade.
6 B	37	49.
6 A	59	51.
7 B	41	57.
7 A	42	59.
8 B	46	59.
8 A	52	57.

AVERAGE RANKS OF THE VARIOUS GRADES OF THE
ENTIRE CITY.

	Ranks.	No. of Cases.
1 A	22.	67
2 B	34.	51
2 A	37.	56
3 B	41.	60
3 A	44.	56
4 B	46.	57
4 A	48.	60
5 B	44.	64
5 A	46.	52
6 B	47.	54
6 A	50.	72
7 B	54.	58
7 A	56.	54
8 B	59.	46
8 A	58.	52

This table gives the distribution of ranks by ages of 817 pupils. Some specimens were thrown out because no age was given:

Age.	No. of Cases.	Grade.
5	4	28.
6	43	28.
7	63	35.
8	95	41.
9	107	45.
10	114	46.
11	104	47.
12	97	52.
13	98	55.
14	57	54.
15	29	51.
16	4	53.
17	2	70.

A number of interesting points may be noted in these results. For example, it is evident that a single judge can apply the scale with a fair degree of consistency, as is shown by the steady improvement manifest in the various grades from the 1st to 8B. The grades 5B, 5A and 6B are the only exceptions. Of these, 5B shows the only marked deviation from the upward trend. The 8A is also slightly inferior to the standard set by the preceding 8B. It is sometimes stated that there are fluctuations in pupils' improvement in handwriting. In this city the 5B and 8A seem to be grades of deterioration rather than of improvement. The most striking improvement is made by the 2B over 1A, a gain of 13 points being shown by this study.

An examination of the age distribution shows the greatest progress between the six- and seven-year-olds (excepting the two cases 17 years old). The age progress is steady up to 14, when there is a slight drop, and another drop is shown by the four cases of 16 years. The standings, however, beyond 15 years are probably not indicative of anything, as the cases are then too few.

It will be noted that the six elementary schools rank fairly close together. School E, which ranks the lowest, 37, contains pupils up to the 4B only. School C, which ranks highest, has small 6th and 7th grade classes. As these classes show a minus deviation from the school average of 45, it is evident that the lower grades are much superior, since they offset the inferiority of the upper grades. The average of the first five grades in this school is 46 +. It will be noted, however, that no samples of 1st grade writing are furnished, a fact which tends to push the average of the school slightly upward.

It would seem from the returns from these six elementary schools that the instruction in handwriting is fairly uniform. Whether these grades have attained the degree of excellence they should can only be determined by comparing them with rankings of the same grades in many other localities. No special method of teaching writing is used in these schools. A medium slant is taught, and some of the teachers try to encourage a muscular movement to some extent. In the grammar school the "Palmer method" is used under the direction of a special writing teacher. This accounts in part for the superiority of the pupils in this school.

The question may properly be raised as to whether the results would have been materially different if the specimens had been ranked by several judges instead of by one only. In order to determine this, 34 specimens were taken at random from the entire collection and were graded independently by eight competent judges. In the following table are given the averages of the ranks assigned by these eight persons to these specimens. In a parallel column is given the average deviation of the different judges from the average rank, and in the third column are given the deviations from these averages of the rankings of the person who ranked *all* the specimens:

Average of the Ranks of Eight Judges.	Average Individual Deviation of Eight Judges.	Deviation of the Single Judge from the Average of Eight.
20	0	0
29	6.5	-9
27	7.5	-7
26	6	-6
27	7.5	-7
51	4.5	-1
41	8.5	-9
54	6	-4
41	6.5	9
64	5	-4
54	7	-4
46	7.6	-6
49	4	1
54	7.6	-4
46	9	-6
52	9.5	-12
49	6.5	-9
55	10.5	-5
67	8	-7
31	2	-1
49	6.5	-9
44	6	-4
54	6	-4
22	3.5	-2
35	7.5	-5
47	4.7	3
45	5	-5
51	4.5	-1
44	9.4	6
49	6.4	1
46	5.2	-6
32	3.5	-2
59	6.5	-9
69	4.2	-9
	Av. 6.1	Av. 4.8

Since the specimens on the standard Ayres scale are placed 10 points apart, *i. e.*, 20, 30, 40—90, it is significant that in every case but one the average of the deviations of the eight judges is below 10 and the *average* of these average deviations is only 6.1. This seems to indicate that, while it is impossible to eliminate entirely the subjective factors in judging handwriting, it may be reduced to a small quantity in the use of this scale. That is, while a given specimen cannot be measured with the same exactitude that a linear distance may be measured by a foot rule, it may be measured within a range of .6 of the distance on either side to the grade above or below.

It is significant also to note that the deviations from these average rankings of the judge who ranked all the 966 specimens is not large, his average deviation being only 4.8, indicating that the ranking of the entire set of 966 by eight judges would not have differed markedly from the ranks assigned by this single judge.

COMMUNICATIONS AND DISCUSSIONS.

PICTURES OF PSYCHOLOGISTS—DO YOU WANT THEM?

Having *The Open Court* pictures of psychologists and philosophers, I have often wished that I had those of present-day psychologists on the walls of my recitation-room. I have thought of writing to psychologists for their photographs, but that would be a good deal of trouble, and if a number followed that plan it would become a nuisance to those whose pictures were most desired. A continuation of *The Open Court* series would be desirable, but who is to decide which of the living men should be included, and would not such a series be unprofitable because of its inclusions and omissions?

The following plan occurs to me as a means of getting what is desired without any of the above disadvantages: Let those desiring photographs name the ones whose pictures are desired to the one who is willing to take charge of the matter. That one can then procure one photograph of each person named and have a plate made from it of the same size as *The Open Court* series and arrange with a photographer to furnish photos from these plates at a reasonable rate.

Are there enough who desire such pictures to make it worth while to inaugurate the plan? This can be answered if all who are interested will at once write to me signifying their desires and naming at least a few of the men whose pictures they wish. Prominent educators and perhaps other men of science might be included if they were asked for. If interested, do not fail to write at once.

E. A. KIRKPATRICK.

Fitchburg, Mass.

ABSTRACTS AND REVIEWS.

M. E. SADLER (Editor). *Moral Instruction and Training in Schools.*

Report of an International Inquiry. London: Longmans, 1909.

Two volumes, pp. lviii, 538, and xxvii, 378. Price 5s. per vol.

Each volume contains an account of the inquiry, the personnel of the committee and the advisory council, the topics of the questionnaire sent out, bibliography classified by countries, table of contents and index.

G. SPILLER. *Moral Education in Eighteen Countries.* Report on

Moral Instruction (general and denominational) and on Moral Training in the Schools, etc. With two introductory essays and

an annotated bibliography of about 750 volumes. London:

Watts, 1909. Pp. xv, 362. Price 3s. 6d., paper.

Sadler's Introduction to the volumes of the first report excellently meets a decided need. In a comprehensive and systematic way it summarizes the results of the investigations, analyzes them into their chief factors and elicits some order out of the chaos of divergent opinions and practices. Moral education is regarded as the central issue in the complex of present educational problems. While the school is only one among the social agencies involved, its influence might be rendered more fruitful. In spite of the unsettled condition of modern ethical opinion, an acceptable and authoritative social ideal may be found in an educational code if it is not minutely prescriptive. As to sanctions, the personal and the social or civic are grounds of general agreement; but they must be supplemented by the religious, and here differences of personal conviction must be respected. Methods must vary widely for age, sex, individual type and kind of school. The three most potent factors in moral education are, first, the teacher's personality; second, the school's corporate life; third, the curriculum. The teacher's personality must be trained, professionalized and cherished by the administration, and must consult the spirit and the demands of the social *milieu*. The corporate life of the school may be wholesomely developed by suitable equipments and organiza-

tion, including games and some measure of self-government, both of pupils vs. faculty and of the individual school vs. educational bureaucracy. In the curriculum the Bible and literature have the prime influence, after which come history, mathematics and natural science; music, drawing and occupations are of recognized value; the competitive examination system has its dangers; systematic practical instruction on social, civic and economic questions should have more place in the school. Training and instruction should be distinguished, and two extremes of opinion and practice are clearly indicated: the first, exemplified in Dewey's views and various radical school experiments in the United States and Europe, emphasizes moral training through the real dynamic life of the school community; the second, exemplified in the French schools, emphasizes the didactic function of the school, with the teacher as leader and master of his obedient and diligent pupils. These two functions should both be largely depended upon. While much valuable moral instruction may be incidental and through occasional addresses or private advice, the tendency is to give increased place to systematic instruction, and this policy is approved by the committee.

Even to mention all the important papers in this work is beyond the scope of this review. Part I presents brief discussions of ideals, methods and sanctions by Dr. F. H. Hayward, Prof. J. J. Findlay, Prof. John Adams, Mrs. Bryant and others. Nearly 400 pages of Part II are devoted to Great Britain. Boys' and girls' schools, secondary and elementary schools, coeducation, teacher-training, Sunday and adult schools and the conditions in Wales, Scotland and Ireland are each treated in one or more chapters. The papers comprise individual essays, symposiums by various groups of educators, summaries of evidence or questionnaires and other co-operative contributions. Among the most significant papers are those by H. B. Smith, Miss S. E. Wells, Miss A. Ravenhill, Rev. J. E. Carpenter, A. Rowntree and Miss E. P. Hughes. In Volume II France is given over 100 pages, with studies by H. Johnson (about the best chapter in the collection), Rev. E. Myers, Miss E. F. Jourdain and others. Other noteworthy chapters are those by J. H. Yoxall on "The Conflict of Opinion in Belgium," etc.; Miss H. Forchhammer on Denmark, G. Spiller on Switzerland and Germany, P. Chubb, W. A. Baldwin and J. D. Burke on the United States, and Baron Kinuchi on Japan.

In his survey of Moral Education in Eighteen Countries, Spiller points out in the chapter on "The Churches and Moral Instruction" the social changes that involve changes in the work of the schools: the growth of industry, democracy, urban population and science has meant the growth of popular universal education, and this has implied state support and control. Both the state and public opinion have become more ethical and less theological. The state cannot control denominational ethical instruction, which is charged with certain inherent defects: the average per cent. of time that the religious lesson gives to ethical content is too small, the pedagogical methods employed are not ethically fruitful, the ethically obvious is stressed at the expense of the development and refinement of moral judgment, as a textbook the Bible is inadequate, and Christian ethics are too narrow and one-sided: other-worldly fanaticism displaces tolerant humanism, we have negative morality vs. the cultivation of the natural virtues, the personal and subjective viewpoint vs. the social and civic, and the modern development of society is either neglected or its bearing on morals denied. But different religions or denominations seem to be substantially equal in their influence on the moral ideal and on conduct; therefore, it is inferred that morality depends rather upon the social than the religious sanctions. As the rest of the curriculum has been gradually secularized, such should be the next step for moral instruction.

Chapter 2 is rich and suggestive in its content, and of marked value. It is both polemical and constructive. We can only briefly review the argument: The aim of education must be really ethical, *i. e.*, more than intellectual, and this should imply agreement about aims and sanctions. The moral aim prevalent in the scholastic mind is too narrow: ethics should include (1) general morals, (2) civics, (3) social economy, (4) general civilization, (5) hygiene; and it has both personal and social aspects. "*The one educational method par excellence is the communication of enthusiasm from teacher to pupil,*" *i. e.*, permanent interest. The ethical (*i. e.*, the humanistic and pragmatic) aspect of every school subject should be emphasized, but incidental and correlated moral instruction alone is inadequate; it needs to be also direct, systematic and separate both from the other subjects and from religion. Several pertinent objections to this view are well discussed, *e. g.*, that morality is dependent on theology; that virtue can't be taught; that experience and the teach-

er's personality are more effective than instruction; that men are not good enough to teach morals; that such instruction would be liable to exploitation by political, economic and theological parties, and that it is dry and cold. The teacher of morals should be like the teacher of any other subject in his enthusiasm, his freedom from external restriction, the kind of motives he appeals to and his emphasis on system. The author here examines a number of current schemes of moral instruction as to the mode of organization of the course; *e. g.*, teaching one virtue after another; emphasizing principles like conscience, freedom, responsibility; special subjects each year; the spiral plan, and the systematic treatment of the relations of life as in the French system. He seems to prefer a modified form of the "systematic treatment of the relations of life," and gives a suggestive and constructive treatment of it in section 25; he emphasizes also the teaching of the four cardinal virtues in their modern meaning, and the connection of the personal and social phases of ethical instruction. The most valuable positive suggestions on aims and methods are given in section 21, *e. g.*, the emphasis on positive methods, on both habituation and reflection, on the distinction of present and future duties, on a broad generous human conception of life, the use of reality vs. fiction, the active side, the need of lengthened school life.

Forty pages of valuable notes to these chapters are given, mainly quotations from ethical and educational literature. These are full of suggestion, and exhibit the actual attitudes of thinkers and authorities in different localities.

Part II contains the report on the 18 countries (all the colonies and divisions of the British Empire, while separately treated, are grouped as one). These reports quote liberally from laws, school codes, syllabi and courses; and they epitomize the conditions for elementary and secondary education, and for denominational and secular instruction. Of special value are the reports on Austria, Belgium, England, France, Germany, United States, Italy and Japan. All of these should be very useful as reference or source material.

Part III contains over 50 pages of bibliography classified according to countries.

E. L. NORTON.

Minneapolis, Minn.

ARNOLD L. AND BEATRICE CHANDLER GESELL. *The Normal Child and Primary Education*. Boston: Ginn & Co., 1912. Pp. 342. \$1.25.

No more helpful and inspiring book has been written for teachers in the last 20 years than this unique volume by Dr. and Mrs. Gesell of Yale University. In these days when pedagogical treatises are so stereotyped, pedantic and lacking in wholesome individuality it is refreshing to find an educational book which is *different*, while at the same time thoroughly sane and based on the best that genetic psychology and experimental pedagogy have to offer. This volume is distinctly not of the ephemeral type. Because it deals with the eternal verities of child life and educational method, and in language which is at once simple, direct, incisive and picturesque, the volume will remain for many years a classic of its kind, comparable in this respect to Ellen Key's *The Century of the Child*, Jane Addams' *The Spirit of Youth* or Dewey's *School and Society*.

The book is the best which has yet appeared in this country on primary education. The first 125 pages present most interestingly the historical and genetic background to the problem of primary education. This division, which has for its purpose to broaden the teacher's professional outlook and to give a liberalizing, biological point of view for the interpretation of child nature, contains such chapters as the biological perspective, the primitive ancestry of the child, instinct and relaxation, touch and the appreciation of things, etc.

Then follow 13 chapters on the pedagogy of the primary school, covering in a strikingly original, stimulating and helpful way the following topics: Drawing, dramatic expression, phonics and speech, language, handwork, literature, reading, handwriting, nature study, busy work, outdoor play, morning exercises, discipline, etc.

The last division contains six excellent chapters on the conservation of child life. Three of these, "The Saving Sense of Humor," "Formalism and Child Personality" and "Childhood, the Foundation of Youth," are nothing less than classical in thought and expression. The book is inspired by a profound insight into child nature and by a rare sympathy for it. Dr. Gesell is a new and inspiring apostle of the rights of children, and believes that the educational possibilities of childhood have been pitifully underestimated. Much of his language combines the ring of Rousseau, the sincerity of Pestalozzi and the pithiness of Emerson. Fundamental and neglected truths

are so expressed as to compel conviction. The teacher's fallacy *par excellence* is that of looking at the educative processes and child life itself from the adult and logical point of view. It is a fallacy from which each generation of teachers must struggle anew to escape. To make teachers genuinely sympathetic with the untamed and natural instincts of childhood is one of the greatest services that can be rendered to the cause of education, and this the present volume does far better, in the reviewer's judgment, than any other book ever written for teachers.

LEWIS M. TERMAN.

Stanford University.

A. L. LOWELL. *College Studies and Professional Training*. Educational Review, 42: October, 1911. Pp. 217-233.

W. D. WALLIS. *Significance of President Lowell's Statistics*. Educational Review, 42: December, 1911. Pp. 514-516.

The educational problem raised by Harvard's president has obvious practical as well as theoretical significance. The question discussed is: Do the graduate students in the Harvard Law and Medical schools reveal in their scholastic attainments (grades) evidences of the type of work, whether mainly literary or mainly scientific, previously pursued as undergraduates in the college of arts and sciences? From the statistics at his command President Lowell answers in the negative. That is, a graduate student in medicine who specialized in science as an undergraduate in college may not be expected, on that account, to stand better in his classes than a student who had not previously specialized in science (save, perhaps, for a short time at the start). He believes that it makes slight difference what subjects a student pursues; that the important thing is the way he does his work. Subject-matter is transferred to a very small extent, mental processes considerably, and moral qualities, like diligence, perseverance and intense application, indefinitely.

Mr. Wallis, in criticism, argues that cramming before examinations might account for high marks just as well as daily diligence and application; that things have been compared that are not mathematically comparable, *e. g.*, it has been assumed that all the students made equal efforts to secure high grades, whereas it is likely that many students sought a broader culture, with little thought of grades. He argues, further, that habits developed in undergraduate work in science might be of actual disadvantage in the more careful technical work of the medical school, and that it is conceivable that

lazy students secured high grades by electing collateral scientific courses. On the whole, then, he believes that Lowell's conclusions do not necessarily follow from the evidence. Statistics from another university might very well yield an opposite result. Moreover, experimental investigation supports the existence of a partial transfer of training.

A. S. EDWARDS.

Cornell University.

FRANZ BOAS. *The Mind of Primitive Man*. New York: The Macmillan Company, 1911. Pp. 294. \$1.50 net.

This book comprises the course of lectures delivered before the Lowell Institute, Boston, 1910-11, and presents in amplified form materials previously set forth by the author in a number of essays and bulletins. The author first undertakes to clear the ground of racial prejudice. The civilized white man of today regards his race as representing the highest possible type. He thinks his achievements are the greatest of any race, and argues therefrom that his aptitude for civilization is greatest, and that his bodily and mental mechanism is of a superior nature. But, in Boas' opinion, the superior culture of the white race is due to accidental causes, not to superior capacity for culture. Twenty centuries ago several other races had a civilization equal to that of the then existing white races. Since then historical conditions have favored the white race and retarded the other races. In anthropological traits the white race is in some respects inferior to other races. Nor can we correlate mental ability with physical traits in any way to argue superiority of the white race.

Characteristic features of the mentality of mankind are the use of articulate language, the use of implements and the power of reasoning. In these features primitive man differs, to be sure, from the civilized white man, but still he is not really inferior to him. The language of primitive man, for example, is based upon a different classification of phenomena, but serves his purpose more effectively than would a developed language of civilization. Mental traits which are, however, characteristic of primitive man are the emotional association of habitual activities and the tendency to invent rationalistic explanations for them, the tendency to accept the crude experiences of previous generations without the analysis common to civilized man, and the symbolic nature of his art.

Boas reproduces here his interesting conclusions that immigration to America has had a direct effect upon the skull dimensions of chil-

dren of foreign parentage born on American soil. Other instances of direct effect of environment on bodily form are found in the changes of type due to the transfer from a rural to an urban life—changes, however, which do not appear to exceed certain definite limits.

The volume concludes with a discussion of race problems in the United States.

Boas' work challenges attention and will undoubtedly stimulate discussion. The form of presentation, however, is obscure, and many parts make difficult reading.

HENRY MAYER.

Cornell University.

PAUL R. RADOSAVLJEVICIL. *Professor Boas' New Theory of the Form of the Head—A Critical Contribution to School Anthropometry.*

Reprinted from the American Anthropologist (N. C.), 13: No. 3, July-September, 1911. Pp. 394-436.

Professor Boas' study of the physical types of immigrants in New York city, conducted under the auspices of the Immigration Commission, resulted in certain surprising and novel conclusions, viz., that the head-form, hitherto considered a permanent racial characteristic, was rapidly modified by the influence of American environment, and that different types of head-form tend to converge toward a common type. This conclusion, which is in fundamental opposition to all hitherto established anthropological theories, is critically examined by Dr. Radosavljevich, who brings forward the following objections: (1) Boas' theory of the head-form does not agree with his own data. (2) The normal differences in degree of particular types studied are probably due, not to the "American soil" or "financial panics," but to countless methodological, technical and mathematical difficulties inherent in the investigation. (3) Boas' method of collecting data is uncritical. (4) Boas' theory is based on a "cross-section" of the facts rather than on a genetic interpretation of them. (5) Boas began and finished the investigation without adequate scientific exactitude and caution.

HENRY MAYER.

Cornell University.

V. VANEX. *Les Classes pour Enfants arriérés.* Bulletin de la Société libre pour l'Étude psychologique de l'Enfant, No. 68, Février, 1911. Paris: F. Alcan. Pp. 53-152. 1 fr. 50.

In 1904 a commission was appointed in France to determine how the compulsory education laws could best be applied to abnormal

children, with reference particularly to the types of schools and classes needed, the conditions of admission, the selection of teachers and the pedagogic methods to be followed. The present bulletin contains the conclusions reached by this commission.

Special classes for backward children, to be termed "improvement schools," are to be annexed to regular schools. Admission is to be made after medical and pedagogical examination, and on recommendation of a board comprised of a physician, a primary-school inspector and a director of special schools. The classes may number 15 pupils, but 12 is better. Pupils may be admitted at the age of 6 and remain until 16. In instruction emphasis shall be placed upon concrete material, with stress on singing, dancing, manual work, school games and gymnastics. Girls are to receive training in sewing, knitting, weaving, basket work, bookbinding, simple housekeeping, etc.; boys must have a work shop, with opportunity for work with wood and iron; a school garden is recommended for every school for backward children, and attention to agricultural training in the country schools. Social utilization is the aim of all the training. Further stipulations are for medical examinations twice yearly, and for both a medical and a scholastic record of the progress of each pupil.

The commission discussed at length methods of differentiating institutional cases from special-class cases and of defining and classifying the subnormal generally. They adopted the definitions proposed by Binet and Simon—idiots being defectives without the use of language; imbeciles being defectives who speak, but do not read and write; the weak-minded (morons) being defectives who learn to read and write, but who show a retardation of two years if less than nine years old, or three years if over nine years old. The third type are those under consideration in the bulletin. For their detection the commission proposes a very careful examination along pedagogical, psychological and medical lines. Pedagogical retardation is to be ascertained by averaging the retardation exhibited in reading, spelling and arithmetic (as determined by prescribed tests), psychological retardation by the Binet-Simon tests (two years' retardation being symptomatic of abnormality). The medical examination is primarily for the detection of physical impairment that might be removed or ameliorated.

The fundamental principles of the training of special-class pupils are by no means so clear, thinks the commission, as those governing

the training of institutional cases. Special classes are still too recent. We have much to learn. Two types of pupil may be distinguished: the true mentally backward type exhibits arrest of mentality, but is affectionate, docile and suggestible; the second, the unstable type, exhibits abnormality of character, is unruly, turbulent, and even violent, reminding one in many respects of the behavior of a three-year-old child, yet showing little or no retardation under the Binet-Simon tests.

The teacher of the special class must, then, treat her pupils as individuals, for no two of them are alike. Lessons must appeal to movement, must deal with the concrete, must be of short duration, must advance by short steps, must present facts by as many different ways as possible. Details of every-day life must be taught for practical results, with lessons, for instance, upon furniture, fuel, illumination, clothing, means of transportation, the dwelling, etc.

Special exercises for training attention, memory, observation, judgment and other mental functions are described under the term "mental orthopedics," *e. g.*, stringing beads, tracing triangles, squeezing the dynamometer, taking and maintaining altitudes at command, recognizing objects by touch, tests of range of apprehension, etc. All manual work, similarly, is to be regarded as a means of psychophysical development, as well as a direct training for occupation.

The commission recommends the employment of record forms on which may be indicated for each pupil his salient tendencies and aptitudes, considered with reference to their practical bearing and gathered from the daily impressions of the teacher.

The bulletin closes with a transcript of the laws and regulations governing the establishment and conduct of institutions for the education of backward children. As this review indicates, the pamphlet contains much of interest to those who are working with mental defectives in the public schools of this country. Supervisors of special classes would do well to read the entire bulletin.

ANNA E. BERRY.

Cornell University.

WILLIAM BOYD. *The Educational Theory of Jean Jacques Rousseau.*
New York: Longmans, Green & Co. Pp. xiv, 368.

This work affords us a much more complete analysis and exposition of Rousseau's system of educational theory than has appeared hitherto in English. It is an account not merely of the system in its final form, but of its development, and is based upon an exhaustive study

of Rousseau's minor writings, as well as of *Émile*, *The New Heloïse* and *The Social Contract*.

The book is admirably planned. Each of the successive stages of Rousseau's career is treated separately. His experiences and the conditions amidst which he lived during each of these periods, respectively, are described, especial attention being given to such as would tend to influence his educational views. Accompanying or immediately following the sketch of each stage of Rousseau's career is an account of the development of his views during that period. The merits of such a plan manifest themselves in the aid which the book affords the reader in acquiring a grasp of Rousseau's views as a whole and in accounting for the exaggerations, inconsistencies and contradictions which characterize his educational writings. After sketching the shiftless and erratic boyhood and youth of Rousseau, the experiences of which constitute that "sound and reasonable education" of which he boasted and which served to so great an extent as a model for the system of education outlined in *Émile*, the author gives some attention to his experience as tutor in the household of M. Mably and to the earliest of his educational writings, the *Projet pour l'Éducation de M. de Sainte-Marie*, which was written at this time. Notwithstanding the lack of originality of this little work, Mr. Boyd is inclined to emphasize its importance in determining Rousseau's attitude toward education. Its composition entailed manifestly a careful study of Locke, and it is to an attempt to remedy some of the defects of the English philosopher's system of education that we owe some of the doctrines characteristic of the *Émile*. "If there had been no *Projet*," Mr. Boyd believes, "in all likelihood there would have been no *Émile*."

Chapters III and IV are devoted to the discussion of the discourses *On the Sciences and Arts* and *On Equality*. It is in the cruder thought of these discourses that Rousseau develops the idea of the opposition of nature and society, the persistence of which in a later and more mature system of thought gives rise to some of the inconsistencies to be found in the *Émile*.

The remaining chapters are devoted to the elucidation of Rousseau's system of educational doctrine as set forth mainly in the *Émile*, but to some extent also in *The New Heloïse*, *The Social Contract* and in later writings. The chapter entitled "The Preparation for *Émile*" is in effect a convincing rebuttal of the charge that Rousseau wrote on education as a mere doctrinaire. Chapter VI is an

illuminating discussion of the development of Rousseau's views as to the relation between the state of nature and the social state.

In the following chapter attention is directed to an aspect of Rousseau's educational thought which has been somewhat neglected. An ideal system of education, Rousseau believed, would be one leading to the attainment of the highest good both for the individual and for the social whole. Such an ideal is attainable, however, only through the complete reorganization of society. Such reorganization being impracticable, Rousseau finds himself restricted in his educational aims to a choice between the good of the individual and the common good, between the education of the man and of the citizen. It matters little in Rousseau's opinion which of these aims is selected. The *Émile*, so generally accepted as a complete account of Rousseau's system of educational theory, contains in reality only his plan for the attainment of the former of these two ends. Mr. Boyd's book performs an important service in drawing attention to the other aspects of Rousseau's educational thought as set forth in his article on political economy and in his *Considerations on the Government of Poland*, where the end sought is the common good rather than the good of the individual. Those whose knowledge of Rousseau's educational doctrine is based solely upon the reading of *Émile* will be surprised to learn that he defines the virtuous man as one whose will is in conformity with the general will in all respects, and that he recommends that children be trained "never to regard their own existence as having any meaning apart from that of the State." It is suggestive that, in spite of Rousseau's denial of the possibility of such a result, the system devised for the attainment of one aim is found to contribute largely to the attainment of the other also.

Chapter VIII is devoted to the discussion of Rousseau's writings subsequent to the publication of *Émile*. The book closes with a critical estimate of Rousseau's permanent contribution to educational thought.

The broad basis which Mr. Boyd has laid for his work and his evolutionary method of treatment explain possibly the eminently judicious attitude he maintains toward his author.

It is unfortunate that the writer has found it necessary to make all his references to a German translation of *Émile* rather than to one of the standard French or English editions.

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EDITORIALS.

Which is of first importance to the child—the receiving of information or the development of the psychophysical organism? Most statements of educational aims emphasize the latter, but **SENSORY** the prevailing practice is based upon the former alternative. Why? It is so easy; those who do not know how **TRAINING.** to teach are often natural experts in imparting information. It is so satisfying; the lecturer, from the kindergarten teacher to the university professor, can cast the statement of fact in such a lucid and artistic form that he is set all aglow with self-appreciation. The pupils approve of it; the ready-made goods seem attractive, and it is so comfortable to be free from effort and have things done for one.

Conversely, the efficient training of the psychophysical organism is very difficult. Take the matter of training the senses. To what extent has educational psychology actually modified practice on this point? Very little. Theoretically, educational psychology has furnished an approach to the pedagogy of sense training by giving in-

sight into the nature and function of sensory experience, showing that it involves only two elementary factors, namely, sensitivity and discrimination; that these are analogous in all the senses; that, aside from normality in the structure of the sense organ, the determining factor in both sensitivity and discrimination is central, a common factor for all the senses; that by right habits of attention the efficient keenness of the senses may be increased manifold above the now prevailing average; that these habits, once established, tend to perpetuate themselves and are an inestimable asset of power; that as a result of high efficiency in the power of sensory acquisition the information which is vital to life will come by the way; and that keen perception, the foundation of intelligence, is a condition for true and vital imagery, faithful memory, clear perception, incisive reasoning and efficient action.

Mere information does not lead to self-mastery; no amount of information stored up in early years can be a substitute for the mastery of the senses, for they are the windows of the soul, and if they are open and bright the rays from without will fill the soul and give it a warmth and vigor which will result in a trenchant growth from within. Our goal is not an information-stocked individual, but an individual of developed powers. Sporadic movements are made from time to time in recognition of this apparently trite principle, but it is so easy to fall back, so difficult to forge ahead consistently.

C. E. S.

It is interesting to note that in the minds of many people a conviction seems to be gaining ground that the subnormal child has of late received more than his share of attention. The net results of the work in special classes and special schools for the feeble-minded are somewhat discouraging. In spite of the most costly equipment in workshops, small classes and specially trained teachers, it is acknowledged that little can be accomplished in the education of those who are handicapped by lack of mental endowment. The most that can be done is to render them in some measure self-supporting. Perhaps the ultimate solution of their problem will be to treat them as wards of the state. Meanwhile, the normal child is the future torch-bearer of our civilization. Is his education receiving the careful, individualized study which his capacity for improvement warrants? Admittedly it has not in the past. The study of the subnormal will have justified its expenditure of means and energy however, if it leads us to realize more clearly our obligation to the normal child.

J. C. B.

NOTES AND NEWS.

The new home schools for boys, of the type originated in England by Dr. Cecil Reddie at Abbottsholme almost a quarter of a century ago, have multiplied and become very popular, both in this country and abroad. Particularly in France has the movement met with a favorable reception; many schools have been founded (among the most noteworthy is *L'École des Roches*), and a flourishing journal, *L'Éducation*, is devoted to their interests. It is now proposed to establish an international bureau of "new schools" in connection with the Jean-Jacques Rousseau Institute, at Geneva—a bureau whose function it will be to collect and disseminate scientific information in regard to the work and the accomplishments of these schools. It is hoped that in this way the results of these "practical experiments in education" will be made more generally accessible to the entire educational world.

The National Association of Audubon Societies announces that it has \$15,000 at its disposal to aid teachers and pupils in furthering bird study in the schools. Teachers who apply will receive, without expense to them, a number of publications on bird study, and pupils will be furnished with colored pictures, leaflets, etc., in return for a small enrollment fee. Teachers and pupils interested in nature study should write to Mr. T. Gilbert Pearson, secretary National Association of Audubon Societies, 1974 Broadway, New York City.

The First International Eugenics Congress, held at the Imperial Institute (University of London) July 24-30, 1912, was a distinct success, both from the point of view of attendance and of the papers presented. The congress was held at the call of the Eugenics Education Society of England, the first distinct organization for the definite purpose of advancing the eugenics propaganda, and the social and political prominence of those who appeared on the program was an indication of the widespread interest which has been aroused. Most of the papers were of a practical and popular nature, designed to stimulate and answer inquiry. Prof. F. S. C. Schiller, in a paper on "Practicable Eugenics in Education," gave a searching analysis of present educational conditions in England considered from the point of view of eugenics.

The Third Annual Meeting of the American Association for Study and Prevention of Infant Mortality was held in Cleveland October 2-5, 1912. The topics for the various conferences were Birth Registration, Continuation Schools of Home Making, Eugenics, Housing, Midwifery, Nursing and Social Work, and Progress in Preventive Work. The program for the eugenics conference included "The Significance of Heredity," Dr. Alfred G. Mayer; "Eugenics and Mental Variations," Roswell H. Johnson; "Mental Deficiency," H. H. Goddard; "The Proper Attitude of the Medical Profession Toward Eugenics;" "The Proper Attitude of the Church and Charitable Institutions Toward Eugenics;" "The Euthenical and Eugenic Aspects of Infant and Child Orthogenesis," J. E. Wallace Wallin.

The Third Annual Conference on the Problem of the Exceptional Child was held at the College of the City of New York October 30 and 31. The general topic of the conference was "The Differentiation Between the Difficult and Backward Child and the Feeble-minded Child." Emphasis was laid upon a recognition of the educational and social rights of the handicapped normal child, and there was a note of protest against the undue attention now commonly paid to the feeble-minded and the degenerate.

The Texas State Conference on Religious Education was held at Austin, October 25-26, 1912. The theme of the conference was "Religious Education in the Schools of Texas," and the discussions were participated in by representatives from the leading colleges, normal schools and city school systems of Texas.

The Second Annual Meeting of the National Council of Teachers of English will be held in Chicago November 28, 1912. Among the topics to be discussed are "Types of Organization of High-School English," "Books for Voluntary Reading," "Dramatic Work," "Oral Composition in College," "Relation of Grammar and Composition," and "Required English Courses in Normal Schools." Action will be taken with regard to a national syllabus and with regard to measures for relieving teachers who are overburdened with written work.

The University Elementary School of the University of Missouri has just moved into a new building specially constructed to meet the peculiar needs of the school. This interesting experiment in school organization has now been carried on for seven years under the direction of the superintendent, Prof. J. L. Meriam, and is meeting with marked success. The traditional course of study is entirely ignored, and the attempt has been made "to organize a course of study more suited to the interests, the needs, the abilities of individual pupils, and more in harmony with present social and industrial life." Thus the industrial and social activities of man become the core of the

work, and the traditional studies are used as means to become conversant with these activities.

Frank Mitchell Leavitt, associate professor of industrial education in the University of Chicago, was one of the speakers at the conference called in Springfield by the Illinois Bankers' Association for August 14 to discuss a proposed state law making provision for "practical" studies in all state schools. The proposed courses are in agriculture, domestic science and industrial education. Professor Leavitt was made a member of the committee to draft the bill, other members being Francis G. Blair, State Superintendent of Public Instruction of Illinois, and Edwin G. Cooley, former superintendent of the Chicago schools. Prof. George H. Mead of the Department of Philosophy in the University of Chicago, who is chairman of the committee on education in the Chicago City Club, was also a member of the conference.

On Tuesday, October 15, Prof. Hugo De Vries addressed the students and faculty of the University of Texas on the subject of "Darwinism in the Light of Recent Experiments."

Prof. Williston S. Hough, dean of the Teachers College and professor of philosophy at the George Washington University, Washington, D. C., died of an ulcer of the stomach September 18 after an illness of three days.

Dr. I. Madison Bentley, assistant professor of psychology in Cornell University, has been appointed professor of psychology and head of the department of psychology in the University of Illinois. Dr. H. P. Weld of Clark University succeeds Dr. Bentley at Cornell.

Dr. W. F. Book, professor of psychology and philosophy at the University of Montana and for the past two years instructor in the Summer School of Columbia University, has accepted a professorship of educational psychology at Indiana University.

CURRENT PERIODICALS.

(In this section only such articles will be noticed as bear directly or indirectly upon the interests of this journal.)

ZEITSCHRIFT FUER PAEDAGOGISCHE PSYCHOLOGIE UND EXPERIMENTELLE PAEDAGOGIK. Vol. XII, 1911. EDUARD CLAPARÈDE. *The Significance of Animal Psychology for Pedagogy.* 145-156. Animals in training and children receiving instruction manifest certain similarities in mental traits and respond in similar ways to training in imitation. The study of animal psychology throws much light on pedagogy.

A. HUTHIER. *The Psychology of Foreign Language Translations.* 156-164. To regard the sentence as a compound of subject and predicate is better than to treat it as a unit, because such division tends to clarify the thought.

ALOYS FISCHER. *Vocational Education and General Education.* 165-175. Illustrating by the development and successful operation of certain schools in Denmark, the writer advocates that vocational education should follow and supplement a thorough general education; the individual and accessory should proceed from the general.

E. MEUMANN. *The Present Status of Pedagogy.* 193-206. Modern pedagogy arose in the study of the psychology of childhood, and has developed through its relations with systematic philosophy and the social sciences; its social phases now occupy the center of attention.

MICHAEL KESSELRING. *Experimental Research on the Theory of Lesson Plans.* 314-324. The results favor longer and less frequent class meetings, which, with advancing grades, may be farther apart.

H. SAEDLER. *The Influence of Opportunity for Festal Experiences Upon the Thought Activity of the Pupils.* 324-333; 390-403. Participation in festal occasions increases mental content and enriches thought activity.

KARL GROOS. *Play as Catharsis.* 353-367. The Catharsis theory is closely related to the "surplus energy" theory. Play generally clarifies the mind, purifies the emotions, removes depression, overcomes harmful tendencies, develops good traits and renders the spiritual life more wholesome.

HEINRICH STADELMANN. *Mental Degeneracy.* 507-520. The article is concerned with tests, evidences and results of degeneracy, and includes examples. Dissociation is the underlying cause.

H. KEMSIES. *Pupils' Offenses and School Punishment According to Statistics.* 520-530; 574-578; 597-621. Most offenses are minor and lightly punished, and nearly all serious ones are committed by a small number of individuals.

_____. *The Industrial School as the Reform School.* 545-552. The industrial school in its present form cannot supply the exact reform now needed, though the introduction of some of its phases would raise the standard of the German schools. Spontaneity, inventiveness and individuality are lacking. Personality is the all-

important factor in all phases of life, and the school should assist in its development.

OTTO SCHEIBNER. *The First German Congress on the Education and the Knowledge of Youth.* 553-574. The autumn session of the Association for School Reform was held in Dresden, October 6th-8th, 1911. "The Industrial School" and "The Problem of Intelligence and the School" were the fundamental problems discussed by the many prominent and representative educators in attendance.

REVUE PSYCHOLOGIQUE. Vol. IV, No. 1, March, 1912.

I. IOTYKO. *How One Remembers Figures, Syllables, Words and Pictures.* 1-20. An experimental study of the memory processes of eleven subjects, including the mathematical prodigy, Mlle. Diamandi. The material was all presented visually, but in the reproduction most of the subjects made use of auditory, motor and other imagery in addition to the visual. There was a constant effort to establish meaningful connections between the parts of the material.

I. IOTYKO. *The Life of Psychic Elements.* 20-45. In this interesting series of three short articles the author endeavors to picture mental life as a biological phenomenon. There is a continuous struggle for existence among the mental responses to the countless stimuli by which we are assailed. The laws of forgetting are only generalizations upon the destruction of the unfit elements of experience, and here, as elsewhere in nature, the mortality is frightfully large. The third article deals with the evolution and dissolution of the mental image.

M. STEFANOWSKA. *The Child, Nature and the Teaching of the Natural Sciences.* 45-51. Current European methods of teaching natural science are arraigned as stiff, formal and contrary to the natural interests and capacities of the child.

O. BUYSE. *The Psycho-physical Problems of Apprenticeship.* 51-55. A valuable survey of important problems in industrial training which call for solution by experimental methods. What are the psycho-physical characteristics that make for success in each of the principal trades? What is the amount of energy required and the degree of fatigue engendered by a unit amount of work in each of the more strenuous trades? What is the nature and rate of the acquisition of skill in each trade? These are instances of the many questions raised.

I. IOTYKO. *Report on the Sentiment of Justice.* 55-69. A statistical study of the results of a questionnaire investigation in two Belgian normal schools. A great majority of the cases of injustice were referable to social causes. School conditions came next, while home conditions gave practically no occasion for the feeling of injustice.

V. KIPIANI. *Bulletin of the Free Society for the Psychological Study of the Child, Paris, 1900-1910.* 99-120. A valuable digest of the publications of the society presided over for so many years by M. Alfred Binet.

PUBLICATIONS RECEIVED TO OCTOBER 1, 1912.

ALFRED BINET AND TH. SIMON. *A Method of Measuring the Development of the Intelligence of Young Children.* Authorized translation by Clara Harrison Town, Ph.D. Lincoln, Ill.: The Courier Company, 1912. Pp. 83. \$1.

In view of the widely-extended and growing interest in the Binet and other tests of intelligence, Dr. Town has rendered a genuine service to English readers in making accessible to them the final form of the Binet scale and the directions for its application. The monograph is translated from the April, 1911, number of the "*Bulletin de la Société libre pour l'Etude psychologique de l'Enfant*," and gives a simple, straightforward description of the tests without distracting theoretical discussion. It should be in the hands of everyone who attempts to use the tests.

SOPHONISBA P. BRECKINRIDGE, Editor. *The Child in the City.* Chicago: The Chicago School of Civics and Philanthropy, 1912. Pp. xiii, 502.

This volume is a collection of the papers read at the conferences of the Chicago Child Welfare Exhibit, May 11-25, 1911, and aims to present "the unsatisfied claims of childhood upon the modern community." The papers are grouped in nine parts under the following headings: I, Personal Service; II, Physical Care; III, The School and the Child; IV, Special Groups of Children; V, The Working Child; VI, The Law and the Child; VII, Libraries and Museums; VIII, Social and Civic Problems of Childhood; IX, The Uncompleted Task.

SOPHONISBA P. BRECKINRIDGE AND EDITH ABBOTT. *The Delinquent Child and the Home.* New York: Charities Publication Committee, 1912. Pp. x, 355. \$2.

This important contribution to the study of the delinquent child is the result of an inquiry into the work of the Juvenile Court of Cook County, Illinois, and deals with the first 10 years (1899-1909) of that institution's history. The book is thus based on the study of over 14,000 children, and attempts to determine the causes of delinquency, to contribute to a better understanding of the needs of all children, and to point out lines of development for juvenile court procedure. We consider it an extremely valuable and authoritative work which will be of great help in clarifying our ideas on moral education. Many of the voluminous discussions of moral education have been too theoretical and too far removed from the facts. We need to study

more carefully the by-products of our great social laboratory of morals, in order that we may avoid the waste which undoubtedly characterizes our present procedure. The Russell Sage Foundation is to be congratulated on having added this number to its excellent series of social studies.

STRATTON D. BROOKS. *English Composition. Book Two.* New York: American Book Co., 1912. Pp. 432. \$1.

"The aim of this book is not merely to develop skill in expressing thought with clearness, ease and force, but also to lead the pupil to draw from his inner consciousness ideas of which he is but dimly aware, and to find in his own experience the richest store of material for composition."

Current Educational Topics, No. II. Abstracts of Papers Presented at St. Louis, Mo., February 26-29, 1912. Prepared by Frederick K. Noyes. Bulletin 487. Washington: Bureau of Education, 1912. Pp. 115.

HENRY S. CURTIS. *The Reorganized School Playground.* Bulletin 488. Washington: Bureau of Education, 1912. Pp. 23.

An admirable discussion of the location, surfacing, maintenance, equipment and management of school yards.

J. A. DELL, M.Sc. *The Gateways of Knowledge. An Introduction to the Study of the Senses.* Cambridge: The University Press. New York: G. P. Putnam's Sons, 1912. Pp. xii, 171.

In the evaluation of the numerous and varied subjects now offered or proposed in our secondary school courses of study the ultimate criterion must be, "What subjects will, in the long run, prove of greatest value to the pupil?" From this point of view it is difficult to see what could be of greater permanent value to the average citizen than a knowledge of himself and of his relations to things about him, and to this end physiology and psychology would be the largest contributors. Physiology is just beginning to find its place in the high-school curriculum, while psychology is generally excluded. In the few places where an attempt has been made to teach psychology in the high school the subject has been presented in such an involved and philosophical manner as to justify the criticism that high-school pupils are not sufficiently mature for that sort of thing. Yet there is no subject in which the adolescent pupil is more keenly interested than in the way in which he becomes aware of things, remembers, feels, thinks and acts. Mr. Dell has written a simple, experimental psychology for upper grammar-school and high-school students from 12 to 15 years of age. Eighty-nine exercises are proposed, covering the whole field of sensory experience. The necessary apparatus is

such as could be furnished by the pupils themselves. In the hands of a live teacher this book could be made the basis of one of the most interesting and stimulating courses that could be offered to high-school students.

JOHN WIRT DINSMORE. *The Training of Children. A Book for Young Teachers.* New York: The American Book Co., 1912. Pp. 336. \$1.

It is difficult to find any rational justification for this book. Purporting to present the essential facts and underlying truths of psychology to young and inexperienced teachers who have had no advanced training, the book abounds in empty platitudes and the vague generalizations of an antiquated faculty psychology. If the author knows anything of the progress of psychological studies during the past 25 years, he has succeeded admirably in concealing this knowledge from his readers.

ARTHUR MACDONALD. *Mentality of Nations in Connection with Patho-social Conditions.* Reprinted from *The Open Court*, 26: No. 8, August, 1912. Pp. 449-460.

"The general purpose of this article is a comparison between States of the Union and of different countries as to education and diffusion of knowledge, and to determine what relation, if any, intellectual conditions may have to patho-social and other conditions in those countries."

ALBERT MOLL. *The Sexual Life of the Child.* Translated from the German by Eden Paul. New York: The Macmillan Company, 1912. Pp. xv, 339. \$1.75.

This is, perhaps, the most important book that has yet appeared on the pathological aspects of the sexual life of the child. It is strictly scientific in its treatment, and presents an unvarnished picture of some disagreeable phases of developing human nature. It is a book for the specialist rather than for the average teacher.

M. V. O'SHEA. *Every-day Problems in Teaching.* Indianapolis: The Bobbs-Merrill Company, 1912. Pp. xli, 388.

This book deals not with problems for experimental investigation, but rather with the elements of success or failure in teaching. It presents a series of concrete examples of effective teaching, or the reverse. Among the topics considered are questions of government and discipline, teaching pupils to think and execute, the tendencies of novices in teaching, and the education of girls. The work represents the fruit of wide and carefully-weighed experience, and will be of great help to the young teacher.

BENJAMIN RAND. *The Classical Psychologists. Selections Illustrating Psychology from Anaxagoras to Wundt.* Boston: Houghton-Mifflin Company, 1912. Pp. xxi, 734. \$3.50.

A very useful source book for a course in the development of psychological thinking. One hundred and fifteen pages are devoted to the ancients, chiefly Greek; 30 pages to the four medieval writers, Tertullian, Gregory of Nyssa, Saint Augustine and Thomas Aquinas, and the remainder of the book, almost 600 pages, is given up to the moderns. The representatives of this group are chosen from a broad field, and the selection gives evidence of a catholic taste. The list includes Hobbes, Descartes, Spinoza, Leibnitz, Wolff, Locke, Berkeley, Hume, Hartley, Bonnet, Condillac, Reid, Brown, Herbert, Beneke, Drobisch, Maine de Biran, James Mill, Bain, Spencer, Johannes Mueller, Lotze, Weber, Fechner, Helmholtz, Hering, Mach, Stumpf, James, Lange and Wundt. Many of the translations were made especially for this volume by Dr. Rand. In each instance it has been the endeavor to select passages which are characteristic of the author's point of view and which have most profoundly influenced the trend of psychological development.

Report of the American Commissioners of the International Commission on the Teaching of Mathematics. Bulletin 486. Washington: Bureau of Education, 1912. Pp. 84.

The reports of the special committees and subcommittees have already appeared in previous Bulletins and have been noticed in these columns. This Bulletin contains the general introduction to and summary of the investigation, and the index for the whole series of reports.

Report of the Commissioner of Education for the Year Ended June 30, 1911. Volume I. Whole number 478. Washington: Bureau of Education, 1912. Pp. xviii, 676. *Volume II.* Whole number 479. Washington: Bureau of Education, 1912. Pp. xliii, 677-1407.

Report of the Committee on Uniform Records and Reports Adopted by the Department of Superintendence of the National Education Association. Bulletin 471. Washington: Bureau of Education, 1912. Pp. 46.

Social Research Council of Boston. Bulletin No. 1. A Preliminary List of Recent Social Investigations in Greater Boston. Cambridge, Mass.: Printed for the Council, 1912. Pp. 42.

A valuable list for the student and social worker.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

PROBLEMS IN THE EXPERIMENTAL PEDAGOGY OF GEOMETRY.

WILLIAM H. METZLER,
Syracuse University.

Geometry has always been considered a subject of high educational value, and therefore it has held its place in the curriculum without much question. Of late years it has, however, in common with other mathematical subjects, had to face the challenge to prove its right to the prominent place it has heretofore held. This challenge has for the most part come from the psychologists, who demand experimental proof for its claims. Another challenge, as to whether the traditional textbook method of teaching the subject is satisfactory, has recently come, more strongly, perhaps, than ever before, from some of the mathematics teachers themselves.

The different methods in vogue today of teaching any subject have not been built on speculative theory only, but are rather the cumulative results of the experiences of teachers in the past. These results have to a large extent come down to us by tradition, and therefore have been subject to the modifications of the changing conditions in the history of the world. Experiments have undoubtedly been performed here and there, and the results have been embodied in the formation of those methods, but what psychologists and others are now asking is that experiments and observations be made under careful conditions and in a systematic and scientific manner. The results can then be carefully studied, properly interpreted and recorded for future use.

The results which we should aim to obtain in the teaching of geometry are, for the ordinary student, as follows:

1. A knowledge of that part of the content which is fundamental and of most importance.

2. The ability to think logically, and a knowledge of the methods and principles of geometric proof and of the nature of proof in general.

These involve: (1) The ability to tell whether a given argument is logically sound and the habit of logically sound thinking. The student must learn to distinguish between necessary and contingent conclusions, and when the judgment has come to a decision as to the most probable hypothesis on which a contingent conclusion is based he should understand that the reasoning in reaching the conclusion is the same as that in reaching a necessary conclusion. (2) The ability to construct a chain of reasoning from given material. In geometry the student learns that he has certain tools by means of which he is to prove a proposition. He also learns how to examine these tools to see what ones are applicable, and then learns the general method of applying them. He learns to analyze, arrange and classify his material. He should then acquire the general methods which underlie all proofs so that when he comes to proofs in other subjects he has a clear knowledge of what constitutes a proof and of its general technique, and can apply it to whatever he may have to do. (3) The ability to think for himself. He must learn to look at a thing from all sides, to size it up in its true relations (which is good judgment). He must force every argument to its conclusion, and acquire the habit of thinking through and through a subject.

3. Ability to express himself clearly. The student must be taught the value and acquire the habit of clear expression.

4. Concentration. The ability to shut out everything else and fix the mind on the subject at hand is a prerequisite to clear thinking, and must be insisted upon in geometry.

5. Constructive imagination. The ability to construct new images out of old elements. To be able to visualize and form the habit of doing so is of great importance.

6. Rational memory. The habit of associating things so as to retain them.

7. Liberal-mindedness. The habit of always looking for new truth and leaving the mind open for its entrance. The student of geometry should be a discoverer, and get into the habit of looking for new light, as well as of looking at things from a broad standpoint.

8. Esthetic ability. Geometry possesses not only beauty of form, but of idea and of method. It should cultivate a habit of neatness and accuracy.

9. A spirit of honesty. The study of geometry soon shows the futility of dishonest thinking. It shows the reward of honest effort.

10. Will power. A well-governed will is essential to usefulness, and the study of geometry makes the student exercise it.

These results are not always obtained, but the aim should be to develop them as fully as possible. It is somewhat of a question as to how they are considered by teachers. Are all but content the incidentals—the mere by-products in the study of the subject, or are they the main object? It is to be feared that they are too often considered incidentals, and that altogether too little attention is given to them. In my estimation they are the chief aim, and the content the incidental, or the occasion for acquiring them. The mere content of most subjects is of little value as compared with the other mental and moral qualities, and the teacher of geometry should see to it that they are obtained from its study.

Not only should these powers be sought for, but they should also be sought for in a general way, and not as related to the subject at hand only. Concentration, for instance, should be insisted upon in connection with geometry, but the teacher should at the same time not limit its value to geometry,¹ but carefully point out that it is an ability of great value in everything. So all these powers, if they are insisted upon in connection with every school subject and taught from this general standpoint, will be applied by the student in connection with everything he undertakes in life.

There seem to be three fairly-well defined lines of experimental work which might be undertaken in connection with this subject. As to the foregoing results, three questions might be asked:

¹It would be well at the very start to impress upon students of geometry the general value of the subject.

1. Are they obtained under any given method?
2. What is the best method of obtaining them?
3. If obtained, is there a transfer from geometry to other subjects?

Experiments in these directions, to be of value, must be performed with the utmost care and under the most certain conditions. So many elements of uncertainty enter that any one person may easily overlook some important factor and thereby spoil the value of the experiment. If the three lines of investigation indicated were carefully carried out and the questions involved settled, there would be no doubt as to the correct aims and proper methods in teaching the subject.

Considering these three questions in order, I would offer under the first, as guides for testing for three of the results and as suggested tests, the following:

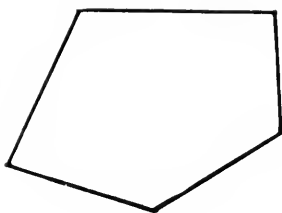
A. KNOWLEDGE OF FUNDAMENTALS; SUGGESTIONS FOR TESTS.

1. Give a series of geometrical figures and have the pupils write the names opposite in a limited time.
2. Give a list of geometrical terms and have the pupils in a limited time—
 - (a) Define them informally.
 - (b) Illustrate such as admit of illustration by a drawing.
 - (c) Give additional properties (not included in the definition) of such as admit of them. These additional properties should not be made to include their relation to external things.
3. State the hypotheses of the fundamental propositions and have the student give the conclusions; time limited.
4. State the conclusions of such propositions and have the students give as many sufficient hypotheses as possible; time limited.

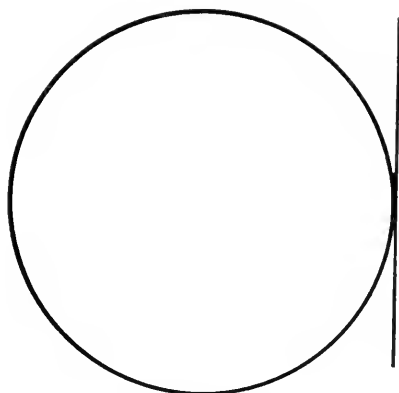
Suggested Test.

Name the following, using a single word or phrase. The marks indicate in several instances what is meant:

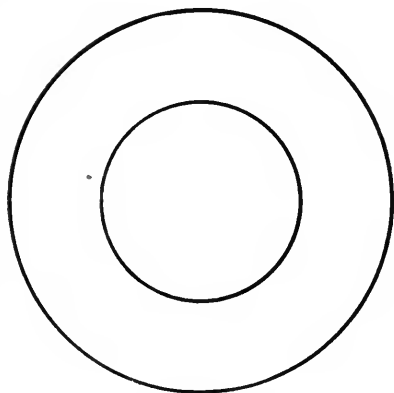
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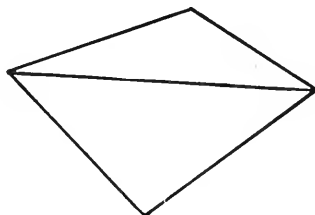
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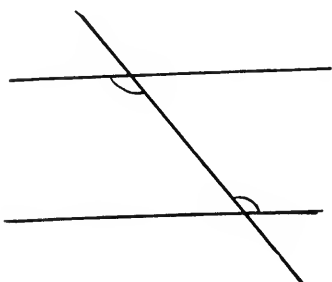
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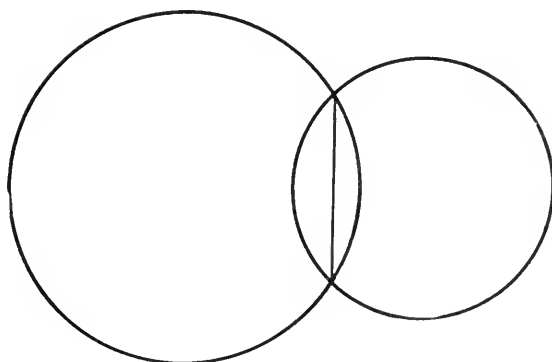
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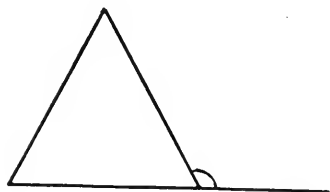
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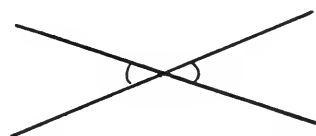
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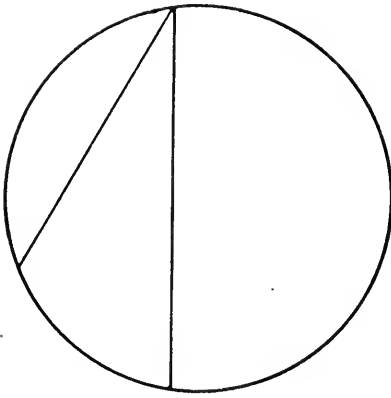
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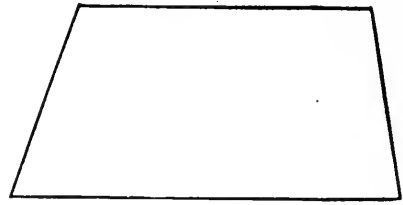
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(9)



(10)



2. Define informally, illustrate by a drawing such as admit of illustration, and give additional properties (not included in the definition) of such as admit of them:

- (1) Polygon.
- (2) Parallelogram.
- (3) Hypotenuse.
- (4) Circle.
- (5) Regular polygon.
- (6) Apothem.
- (7) Similar polygons.
- (8) Adjacent angles.
- (9) Inscribed angle.
- (10) Perpendicular lines.
- (11) Supplementary adjacent angles.
- (12) Exterior angle of a triangle.
- (13) Equilateral triangle.
- (14) Projection of a line segment on another line.
- (15) Locus.
- (16) Altitude of a trapezoid.
- (17) Base of a trapezoid.
- (18) Area of a surface.
- (19) Circumscribed polygon.
- (20) Converse.
- (21) Secant.

- (22) Chord.
- (23) Diagonal of a pentagon.
- (24) A line segment divided externally.

3. Give conclusions for the following:

- (1) If two parallel lines are cut by a transversal.....
(Three conclusions.)
- (2) If two angles of a triangle are unequal.....
- (3) The sum of the interior angles of a polygon equals
.....
- (4) If a line is the perpendicular bisector of a sect.....
- (5) If a straight line is perpendicular to a radius where
the radius meets the circumference.....
- (6) In a triangle if a line is drawn cutting the sides and
parallel to the base.....
- (7) An angle formed by two chords intersecting within
the circumference is measured by.....
- (8) In any triangle the square on the side opposite an
acute angle is equal to.....
- (9) Two circumferences have the same ratio as.....
- (10) The areas of similar polygons are as.....
- (11) The area of a regular polygon is equal to.....
- (12) If two triangles have an angle of one equal to an
angle of the other, their areas.....
- (13) The area of a circle is equal to.....
- (14) The locus of the vertex of a right angle opposite a
given fixed hypotenuse is.....
- (15) If a perpendicular is drawn from the vertex to the
hypotenuse of a right triangle.....

4. State the sufficient hypotheses in each of the following:

- (1) Two angles are equal if.....
- (2) Two straight lines are parallel if.....
- (3) Two straight lines are perpendicular if.....
- (4) Two sects (segments of straight lines) are unequal
if.....
- (5) Two triangles are congruent if.....
- (6) A quadrilateral is a parallelogram if.....
- (7) A sect is a mean proportional between two other
sects if.....

- (8) Two triangles are similar if.....
- (9) A polygon is regular if.....
- (10) Two parallelograms are congruent if.....

B. REASONING, GEOMETRICAL AND GENERAL; SUGGESTIONS FOR TESTS.

1. Tests in geometry.

- (a) Give tests on originals (with time limited) at various stages of the study of the subject.
- (b) Have the students give a full description of the method used in analyzing the questions and the steps leading to their conclusions.

Observe from (a) the degree of ability to reason correctly, and from (b) the students' knowledge of the methods of logical attack and the ability to analyze their own thought processes. As the study of geometry proceeds there should be improvement if the pupil is grasping the subject.

2. Tests in other subjects.

- (a) Give tests in some subject, other than geometry (with time limited), involving reasoning of like logical difficulty and concerning data of equal familiarity as in geometry, but such tests should not be to reproduce proofs they may have already had.
- (b) As in 1 (b).

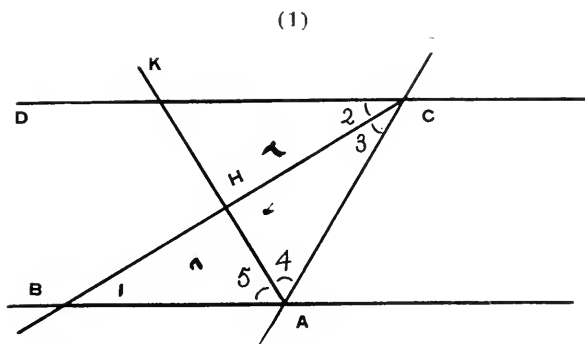
Observations similar to those made in 1 should be recorded. The test consists in observing whether the improvement in 2 (a) and (b) bears any ratio to the improvement in 1 (a) and (b).

Directions.—Test 2 should be given just before beginning the study of geometry, and both 1 and 2 at regular intervals throughout the course, and, if possible, other tests in 2 should be given at similar intervals after finishing the study of geometry. Test 2 should also be given, when possible, to pupils in the same year of high school who are not taking geometry, and the results compared with the results of those who are taking it. The differences should be carefully noted.

Suggested Tests.

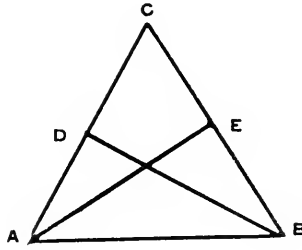
1. Test in geometry.

- (a) Draw and letter the figures and state the hypothesis and conclusion in terms of your notation in each case:
 - (1) The median from the vertex to the base of an isosceles triangle bisects the vertical angle.
 - (2) If one acute angle of a right triangle is double the other, the hypotenuse is double the shorter leg.
 - (3) The bisector of one of two vertical angles bisects the other.
 - (4) If the perpendiculars from two vertices upon the opposite sides in a triangle are equal, the triangle is isosceles.
 - (5) The line joining the middle points of the diagonals of a trapezoid is equal to half the difference of the bases.
- (b) Demonstrate the following; formulate the general statement without the use of reference letters:



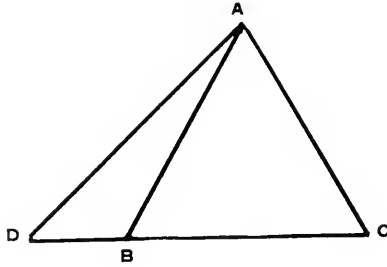
Given $\angle 2 = \angle 3$, $\angle 4 = \angle 5$, and $KA \perp CH$, prove $AB \parallel CD$.

(2)



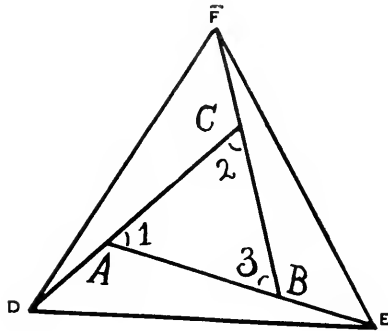
Given AE perpendicular to BC; given BD perpendicular to AC, and angle BAC equal to angle ABC, show that angle BAE is equal to angle ABD.

(3)

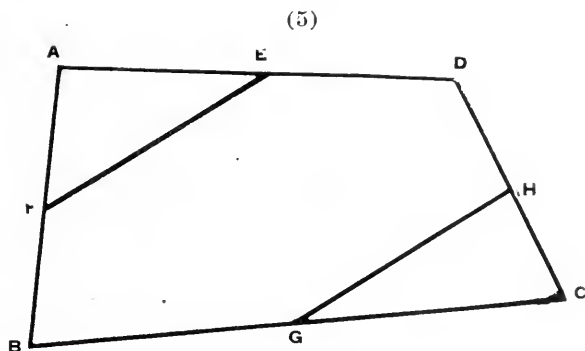


Given AB equal to BC equal to CA, shew that AD is less than CD.

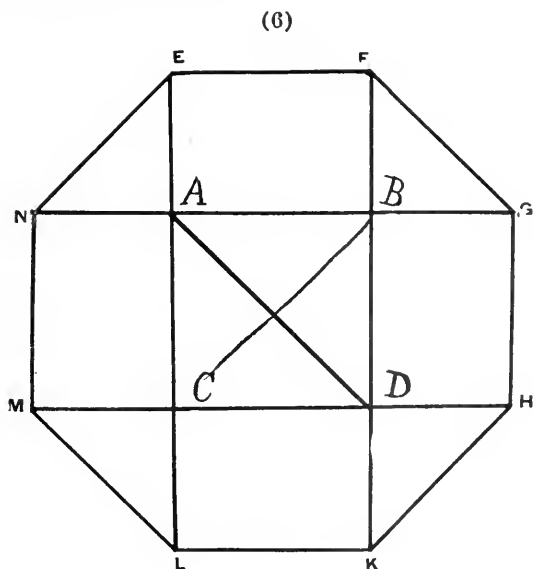
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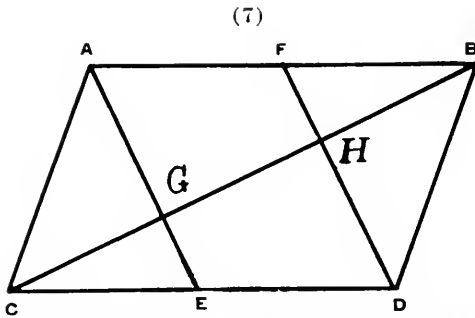
Given the angles 1, 2, 3 equal, and AD , BE , CF equal, show that DE is equal to DF .



Given E , F , G , H , the midpoints of the sides of $ABCD$, show that FE is parallel to GH .

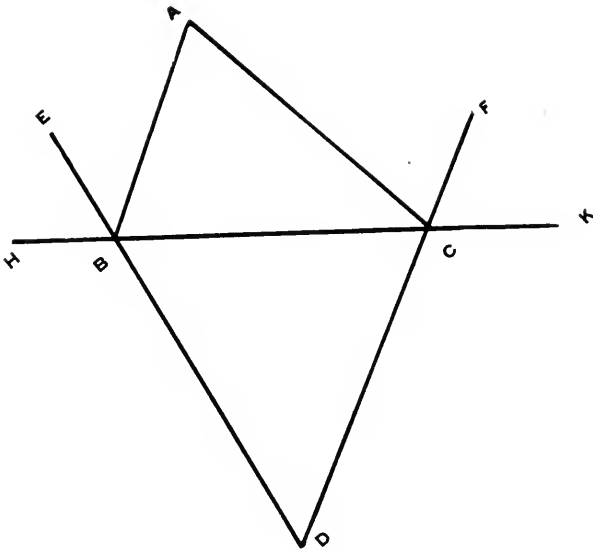


Given $ABCD$, a square, and AN , AE , BF , BG , DH , DK , CL , CM , each equal to one-half of AD , prove $EFGHKL MN$ is a regular octagon.



ABCD is a parallelogram and E and F are the midpoints of AB and CD. Prove that $CG = GH = HB$.

(8)



DE and DF bisect the angles HBA and KCA. Prove that $\angle EDF = \frac{1}{2} (\angle ABC + \angle BCA)$.

NOTE.—A good test would be to give figures and ask the student to prove all the propositions they can connected with it. For instance, the figure



would involve several propositions.

(c) Demonstrate:

- (1) If two circles are tangent externally at A, the tangents to them from any point on the common tangent at their point of contact are equal.
- (2) If two circles intersect at P and Q, and PA and PB are diameters, then QA and QB are in the same straight line.
- (3) If the bisector of the angle A of an inscribed triangle ABC meets BC in D and the circumference in P, then $AB \times AC = AD \times AP$.
- (4) To draw a circle with a given radius that will pass through a given point and be tangent to a given line.
- (5) A chord 24 inches long is 9 inches from the center of a circle; find the length of the tangents drawn from the extremities of the chord and produced till they meet.

(d) Demonstrate:

- (1) If the diagonals of a trapezoid are equal, the trapezoid is isosceles.
- (2) If perpendiculars be drawn from any point within an equilateral triangle to the three sides, their sum is equal to the altitude of the triangle.
- (3) The area of the ring included between two concentric circles is equal to that of a circle whose radius is one-half of a chord of the outer circle drawn tangent to the inner.
- (4) Prove that if one leg of a right triangle is the diameter of a circle, the tangent at the point where the circumference cuts the hypotenuse bisects the other leg.

- (5) What is the locus of the midpoint of one leg of a right triangle whose hypotenuse is fixed? Prove the correctness of your answer.
2. Tests in other subjects.
- (a) Starting with each of the following propositions in turn as true, state which of the others must then be true, which may then be true, and which cannot then be true.

(NOTE.—It is assumed that there exist things which are solids, things which are not solids, things which are crystals, and things which are not crystals.)

- (1) All crystals are solids.
- (2) Some solids are not crystals.
- (3) Some not crystals are not solids.
- (4) No crystals are not solids.
- (5) Some solids are crystals.
- (6) Some not solids are not crystals.
- (7) All solids are crystals.

For instance:

If 7 is true, 3, 5, 6 must be true; 1, 4 may be true, and 2 cannot be true.

- (b) What conclusions (if any) can be drawn from each pair of the following statements?
- (1) None but residents are members of the club.
 - (2) Some members of the club are not officers.
 - (3) All members of the club are invited to compete.
 - (4) All officers are invited to compete.
- (c) Point out any defects in the reasoning in the following cases:
- (1) It is impossible to maintain that the virtuous alone are happy, and at the same time that selfishness is compatible with happiness, but incompatible with virtue.
 - (2) Bullies are always cowards, but not always liars; liars, therefore, are not always cowards.

(NOTE.—Test (a) can be repeated at frequent intervals by changing the order of the sentences and substituting other words for "crystal" and "solids.")

- (3) Most M is P; most S is M; therefore, some S is P.

C. CONCENTRATION; SUGGESTIONS FOR TESTS.

1. Tests with unusual distractions.

(a) Give (under distractions of some definite kind, such as the ticking of a metronome, the reading aloud of an interesting book, or the conducting of a recitation in the same room) tests (with time limited) to work out some originals that require concentration. Give these from time to time, and in so far as possible use originals of about the same difficulty and familiarity of principle involved, and see if the time required diminishes with the length of time geometry has been studied.

(b) Same as in (a), using other than geometrical exercises.

2. Tests without unusual distractions.

(a) Same as in 1, (a).

(b) Same as in 1, (b).

Directions.—If possible, test 2, (b), should also be given to pupils in the same grade of high school who are not studying geometry, and the results compared with the results of those who are taking it. The differences should be carefully noted.

Suggested Tests.

The foregoing tests would serve very well for tests in concentration. Series (a), (b), (c) could be given at different times.

Under the second question as to what is the best method of obtaining the desired results it may be said that, besides many special devices, there has come to be three fairly well recognized general methods of teaching the subject. They are: the textbook method, the suggestive method, and the syllabus method. To determine which of these is best, or the relative merits of special devices, one should by well-selected experiments test the results. As different schools use different methods, the results might be compared by giving the same test to different schools.

To test for transfer is not by any means in all cases an easy

problem, and in some of its phases it would seem almost, if not entirely, impossible. Tests for some phases, viz., reasoning, concentration, etc., have been already suggested, and tests for other phases could be devised.

As has been pointed out, to obtain the results from the study of geometry enumerated above as general, and not peculiar to the subject only, it must be taught with them in view. They must be made objects themselves worthy of acquisition. In view of this, experiments to test the transfer of accuracy from numerical calculation to reasoning in arithmetic do not signify much unless we know from what standpoint and with what object accuracy in connection with numerical work has been taught. It is not sufficient to leave a power or habit to purely accidental acquirement. It must be taught as something in itself worthy of possession. We would hardly expect a boy to be honest if honesty was never mentioned to him except to have it impressed upon him that he should be honest with his teacher. He must be taught the importance of honesty with everyone and everywhere.

Possibly some will say that teaching abilities and habits such as accuracy in this general way in connection with numerical computation one is not teaching it here only, but in connection with everything. While there may be some truth in this, it is also true that if accuracy is taught in this way in connection with every subject in the curriculum, it will go with the pupil all through life and be transferred by him to everything he undertakes. That which is impressed upon one from a few standpoints, or taught as of importance in connection with but one or two subjects, is not likely to be considered of much importance in others, and will not become a habit in all.

Perhaps no subject teaches anything in itself, but simply furnishes the means for bringing out the lesson. As some occasions furnish better opportunities than others for instilling lessons, so some subjects are perhaps better suited than others for getting the mind in the best psychological condition to be impressed by and to possess some of these powers.

AN INVESTIGATION ON THE VALUE OF DRILL WORK IN THE FUNDAMENTAL OPERATIONS OF ARITHMETIC.

PART II.

J. C. BROWN,

Horace Mann High School, New York City.

(Concluded from the November number.)

A comparison will now be made of the records of the 19 pupils of the non-drill sections, who did poorest work on the first test, with the average records for the non-drill sections. Later a comparison will be made between the poorest 19 and the best 19 of the non-drill sections.

Comparison of the poorest 19 of non-drill sections with entire non-drill sections.

(These 19 cases are selected on the records made on first test.)

Poorest 19 on first test made an average of 15.2 points and median of 15 points.

Average on first test of all non-drill pupils = 26.1 points and median of 28 points.

Poorest 19 were 41 per cent. below arithmetical average and 46 per cent. below the median on first test.

Poorest 19 on second test made an average of 19 points and median of 19 points.

Average on second test of all non-drill pupils = 28.6 points and median of 25 points.

Poorest 19 on second test were 33 per cent. below arithmetical average and 33.5 per cent. below the median.

Of the poorest 19 in the non-drill classes, 8 were boys and 11 were girls.

Of the poorest 19 in the non-drill classes, 7 were from City D, 9 from City M, and 3 from City C.

The average age of the poorest 19 of the non-drill classes was 2.4 per cent. greater than the average age of all pupils in the non-drill classes. Four of these 19 pupils had been retarded in either the fifth or sixth grades, or both.

Comparison of best 19 of non-drill section with entire non-drill section, based on total number of points made on first test.

Best 19 on first test made average of 36.2 points and median of 35 points.

Average on first test of all non-drill classes = 26.1 points and median of 28 points.

Best 19 were 38.8 per cent. above arithmetical average and 25 per cent. above the median on first test.

Best 19 on second test made average of 32.7 points and median of 29 points.

Average on second test of all non-drill classes = 28.6 points and median of 19 points.

Best 19 on second test were 14.3 per cent. above arithmetical average and 52.6 per cent. above the median.

Of the best 19 in the non-drill class, 14 were boys and 5 were girls.

Of the best 19 in the non-drill class, 10 were from City D, 1 from City M, 2 from City C, and 6 from P.

The average age of the best 19 of the non-drill classes was 2.4 per cent. greater than the average age of all pupils in these classes, and was exactly the same as that of the poorest 19. Two of the best 19 had been retarded in either the fifth or sixth grades, or both; four of the poorest 19 had been similarly retarded.

Comparison of the best 19 and the poorest 19 of the non-drill sections, based on total number of points on first test.

Best 19 on first test made an average of 36.2 points and a median of 35 points.

Poorest 19 on first test made an average of 15.2 points and a median of 15 points.

Best 19 on first test were 38.8 per cent. above arithmetical average and 25 per cent. above median.

Poorest 19 on first test were 41 per cent. below arithmetical average and 46 per cent. below median.

Best 19 on second test made an average of 32.7 points and median of 29 points.

Poorest 19 on second test made an average of 19 points and median of 19 points.

Best 19 on second test were 14.3 per cent. above arithmetical average and 52.6 per cent. above median.

Poorest 19 on second test were 33 per cent. below arithmetical average and 33.5 per cent. below median.

On first test best 19 scored 3.1 times as many points as poorest 19.

On second test best 19 scored 2 times as many points as poorest 19.

Comparison of poorest 19 of drill sections with combined drill sections, based upon total number of points scored on first test.

Poorest 19 on first test made an average of 13.1 points and a median of 12 points.

Average on first test of all drill pupils was 26.6 points and a median of 28 points.

Poorest 19 were 50.7 per cent. below arithmetical average and 50 per cent. below median on first test.

Poorest 19 on second test made an average of 25.1 and a median of 22.

Average on second test of all drill classes was 33.3 and a median of 37 points.

Poorest 19 were 23.7 per cent. below arithmetical average and 40.5 per cent. below the median on second test.

Of the poorest 19 in the drill sections, 8 were boys and 11 were girls.

Of the poorest 19 in the drill sections, 5 were from City D, 8 from City M, 5 from City C, and 1 from City P.

The average age of the poorest 19 in the drill sections was 12.9, which was 5.7 per cent. greater than the average age of all pupils examined and 2.3 per cent. greater than the average age of the best 19 in the drill sections.

*Comparison of best 19 of drill section with entire drill section,
based upon total number of points made in first test.*

Best 19 on first test made average of 41.2 points and median of 39 points.

Average on first test of all drill classes was 26.6 and median was 28.

Best 19 were 54.8 per cent. above arithmetical average and 39 per cent. above median on first test.

Best 19 on second test made average of 50.14 points and median of 45 points.

Average on second test of all drill classes was 33.3 and median of 37 points.

Best 19 were 50.5 per cent. above arithmetical average and 21.3 per cent. above median on second test.

Of the best 19 in the drill sections, 10 were boys and 9 were girls.

Of the best 19 in the drill sections, 5 were from City D, 5 from City M, 3 from City C, 6 from City P.

The average age of the best 19 in the drill sections was 3.1 per cent. greater than the average age of all pupils examined, and was 2.3 per cent. lower than the average age of the poorest 19 in the drill sections.

Four of the best 19 in the drill sections had been retarded in the fifth or sixth grades, or both, and 9 of the poorest 19 had been similarly retarded.

*Comparison of best 19 and poorest 19 of drill sections, based
on total number of points scored in first test.*

Best 19 on first test made an average of 41.2 points and a median of 39 points.

Poorest 19 on first test made average of 13.1 points and a median of 12 points.

Best 19 on first test were 54.8 per cent. above the average and 39 per cent. above the median.

Poorest 19 on first test were 50.7 per cent. below the average and 50 per cent. below the median.

Best 19 on second test made average of 50.14 points and a median of 45 points.

Poorest 19 on second test made average of 25.1 points and a median of 22 points.

Best 19 on second test were 50.5 per cent. above the average and 21.3 per cent. above the median.

Poorest 19 on second test were 23.7 per cent. below the average and 40.5 per cent. below the median.

On first test best 19 scored 3.1 times as many points as poorest 19.

On second test best 19 scored 1.9 times as many points as poorest 19.

The effect of the drill here, as was the case in the first study, seems to be greatest on the poorest portion of the class. It decreases the variability of a given class.

The following tables are the basis upon which the conclusions immediately preceding are based:

*Based on record of first test. Non-drill sections.
Poorest nineteen.*

Cases.	Total Points First Test.	Total Second Test.	Gain.	Gain. Per Cent.	First Six Probs. First Test.	First Six Probs. Second Test.	Per Cent. Gained on First Six.	Age.	City.	Boy.	Girl.
1	11	15	4	36.3	11	15	36.3	14	D		X
2	11	16	5	45.4	11	16	45.6	13	D		X
3	11	30	19	173	11	30	173	11	M		X
4	12	20	8	66	12	20	66	11	M		X
5	13	17	4	30.7	13	17	30.7	14	M		X
6	14	13	-1	-7.1	14	13	-7.1	11	C	X	
7	14	18	4	28.5	14	18	28.5	13	M		X
8	14	19	5	35.7	14	19	35.7	11	M	X	
9	14	19	5	35.7	14	19	35.7	11	M	X	
10	15	21	6	60	15	21	60	12.5	D		X
11	15	25	10	66.6	15	25	66.6	11	D		X
12	16	14	-2	-12.5	16	14	-12.5	14	M		X
13	17	26	9	52.9	17	26	52.9	13	M		X
14	18	14	-4	-22.2	18	14	-22.2	14	M	X	
15	18	12	-6	-33.2	18	12	-33.2	15	D		X
16	19	20	1	5.2	19	20	5.2	11	C	X	
17	19	18	-1	-5.2	19	18	-5.2	12	D	X	
18	19	27	8	42.1	19	27	42.1	12.5	D	X	
19	19	21	2	10.5	19	21	10.5	14	C	X	
Totals: . . .	289	372	73	608.6	289	372	608.6	238		8	11
Arith. Av. 15.2		19.0	3.8	32.01	15.2	19.0	32.01	12.5			
Med.	15	19	4	35.7	15	19	35.7				
Mode.	{ 14	..	5	35.7	{ 14	..	35.7				
	{ 19				{ 15						

*Based on record of first test. Non-drill sections.
Best nineteen.*

Cases.	Total Points First Test.	Total Second Test.	Gain.	Per Cent. Gain.	First Six Probs., First Test.	First Six Probs., Second Test.	Per Cent. Gained on First Six.	Age.	City.	Boy.	Girl.
1	45	40	-8	16.6	28	31	10.7	14	D	X	
2	46	34	-12	-26	31	30	-3.2	11	P		X
3	42	28	-14	-33.3	32	27	-15.6	14	D	X	
4	41	51	-10	23.8	31	32	3.2	12	P		X
5	39	30	-9	-20.9	29	24	-17.2	12.5	P	X	
6	37	30	-7	-18.9	32	30	-6.6	13	D		X
7	36	32	-4	-11.1	32	31	-3.1	11.5	D		X
8	36	30	-6	-16.6	32	30	-6.6	14	M	X	
9	35	32	-3	-8.3	31	30	-3.2	11	D	X	
10	35	29	-6	-17.1	31	28	-9.6	12	D	X	
11	34	47	13	37.1	30	31	3.3	12	P	X	
12	33	26	-7	-21.2	23	27	-17.3	12	D	X	
13	33	27	-6	-17.6	31	26	-16.1	11	D	X	
14	32	51	+19	59.3	31	25	-19.3	11	D	X	
15	32	25	-7	-21.8	32	25	-21.8	15	C	X	
16	32	23	-9	-28.1	32	20	-37.5	13	C		X
17	32	32	0	0	32	32	0	11	P	X	
18	32	27	-5	-15.6	29	25	-14.1	13.5	D	X	
19	32	26	-6	-18.7	32	23	-28.1	12.5	M	X	
Totals....	687	620	-67	-17.0	581	527	.....	238		14	5
Arith. Av.	36.2		32.7	-3.5		30.6	-9.3	12.5			
Median...	35		29	-6							
Mode....	32		30	-6							

*Based on record of first test. Drill section.
Poorest nineteen.*

Cases.	Total Points First Test.	Total Second Test.	Gain.	Per Cent. Gain.	First Six Probs., First Test.	First Six Probs., Second Test.	Per Cent. Gained on First Six.	Age.	City.	Boy.	Girl.
1	7	26	19	271.42	7	24	242.8	12	M		X
2	10	12	2	20	10	12	20	12	M		X
3	10	19	9	90	10	19	90	14.5	C	X	
4	18	15	-3	-16.6	18	12	-33.3	11	M		X
5	10	50	40	400	29	31	+6.9	12	P	X	
6	11	15	4	36.4	11	15	36.4	16.5	D		X
7	11	26	15	83.3	18	32	77.7	10.0	M		X
8	11	33	21	190.9	11	28	154.5	11	C		X
9	12	16	4	33.3	12	16	33.3	14	M		X
10	12	20	8	66.6	12	20	66.6	11	M		X
11	12	21	9	75	12	21	75	13	M		X
12	12	23	11	91	12	23	91	12	D		X
13	12	30	18	150	12	27	125	14	C	X	
14	13	26	13	100	13	26	100	15	C	X	
15	15	17	2	13.3	13	17	13.3	15	M		X
16	16	29	13	81.2	16	29	81.2	12.5	C	X	
17	17	19	2	10.6	17	19	10.6	14	D	X	
18	17	27	10	58.8	17	27	58.8	15	D	X	
19	17	31	14	82.3	17	22	29.3	12	D	X	
Totals....	250	469	219	1857.4	255	401	.....	246			
Arith. Av.	13.1		25.1	12		21.1	+57.2	12.9		8	11
Median...	12		22	10							
Mode....	12		.....	.....					

Based on record of first test. Drill section.
Best nineteen.

Cases.	Total Points First Test.	Total Second Test.	Gain.	Per Cent. Gain.	First Six Probs. First Test.	First Six Probs. Second Test.	Per Cent. Gained on First Six.	Age.	City.	Boy.	Girl.
1	62	76	14	22.6	32	32	0	13	P	X	
2	57	69	12	21	26	32	23.0	14.5	C		X
3	50	53	3	6	32	32	0	11	D	X	
4	49	48	-1	-2	29	30	3.4	13	P	X	
5	46	51	5	10.9	32	31	-3.1	11	C		X
6	42	48	6	14.2	32	30	-6.6	12	P		X
7	42	36	-6	-14.2	32	32	0	12	D	X	
8	41	49	8	19.5	31	31	0	11.5	C		X
9	40	53	13	32.5	31	32	3.2	12	M		X
10	39	47	8	20.5	30	31	3.3	12	D	X	
11	38	44	6	15.8	28	31	10.6	15	M		X
12	37	38	1	2.7	32	30	-6.6	15	D		X
13	37	52	15	40.5	32	29	-9.3	12	P	X	
14	36	80	44	125	31	23	-25.8	13	P	X	
15	34	44	10	29.4	25	32	28	12	P		X
16	34	37	3	8.8	32	31	-3.1	12	M	X	
17	34	34	0	0	31	31	0	14	M	X	
18	33	54	21	63.6	32	31	-3.1	12	M		X
19	33	31	-2	-6	32	25	-21.8	12	D	X	
Totals....	784	954	170	411.2	582	576	.....	239			
Arith. Av.	41.2	50.14	8.94	21.1	30.6	30.3	-1	12.6		10	9
Median...	39	45	6	15.8							
Mode.....	34	.....	.....	.....				

Comparison of the best and poorest 19 of the non-drill sections, based upon gross gain in points.

The best 19 of the non-drill classes made a gain ranging from 6 to 19 points, with an average gain of 10 points and a median gain of 9 points.

The poorest 19 of the non-drill classes made a gain ranging from (- 17) to (- 6), with an average gain of (- 8) points and a median gain of (- 5) points.

The greatest gain of the best 19 represented a gain of 59.8 per cent. on the record of the first test. The least gain of the best 19 represented a gain of 40 per cent. on the record of the first test.

The greatest gain of the poorest 19 represented a gain of (- 18.9 per cent.) on the record of the first test; the least gain of the poorest 19 represented a gain of (- 54.8 per cent.) on the record of the first test.

*Comparison of the best and poorest 19 of the drill sections,
based on gross gain in points.*

The best 19 of the drill classes made a gain ranging from 18 to 46 points, with an average of 26 points, and a median gain of 22 points.

The poorest 19 of the drill classes made a gain ranging from (— 13) to + 1 points, with an average of (— 3.1) points, and a median gain of (— 2) points.

The greatest gain of the best 19 represented a gain of 148.3 per cent. on the record of the first test, and the least gain represented a gain of 72.7 per cent. on the record of the first test.

The greatest gain of the poorest 19 represented a gain of 3.1 per cent., and the least gain of the poorest 19 represented a gain of (—37.1 per cent.) on the record of the first test.

*Comparison of the best and poorest 19 of drill class with best
and poorest 19 of non-drill class, based upon gross
gain in points.*

Best 19 of drill classes made gain ranging from 18 to 46 points, average 26 points.

Best 19 of non-drill classes made gain ranging from 6 to 19 points, average 10 points.

Best 19 of drill classes made a median gain of 22 points.

Best 19 of non-drill classes made a median gain of 9 points.

Poorest 19 of drill classes made gain ranging from (— 13) to + 1 points, average (— 3.1).

Poorest 19 of non-drill classes made gain ranging from (— 17) to (— 6) points, average (— 8).

Poorest 19 of drill classes made median gain of (— 2) points.

Poorest 19 of non-drill classes made median gain of (— 5) points.

Greatest gain of best 19 of drill classes was 148.3 per cent. on previous record.

Greatest gain of best 19 of non-drill classes was 59.8 per cent. on previous record.

Greatest gain of poorest 19 of drill classes was 3.1 per cent. on previous record.

Greatest gain of poorest 19 of non-drill classes was (— 18.9) on previous record.

Least gain of best 19 of drill classes was 72.7 per cent. on previous record.

Least gain of best 19 of non-drill classes was 40 per cent. on previous record.

Least gain of poorest 19 of drill classes was (— 37.1 per cent.) on previous record.

Least gain of poorest 19 of non-drill classes was (— 54.8 per cent.) on previous record.

In all of the preceding tables it appears that the improvement made by members of the drill classes averages from two to three times as much as the improvement made by the non-drill classes.

The data of this study corroborate in every essential particular the data and the conclusions of the first study. In comparing the results of the first and second studies it should be recalled that the results of the first study followed a drill period of 30 recitations and those of the second study followed a drill period of 20 recitations.

A summary of the results attained by the drill classes in the first and second study will now be given.

Summary of the results attained by the drill classes in the first and second study.

In the first study drill classes made an improvement of 21.2 per cent. on number of problems worked.

In second study drill classes made an improvement of 16.9 per cent. on number of problems worked.

In first study drill classes made an improvement of 33.4 per cent. in addition.

In second study drill classes made an improvement of 18.5 per cent. in addition.

In first study drill classes made an improvement of 36.9 per cent. in subtraction.

In second study drill classes made an improvement of 32 per cent. in subtraction.

In first study drill classes made an improvement of 30 per cent. in multiplication.

In second study drill classes made an improvement of 24.1 per cent. in multiplication.

In first study drill classes made an improvement of 28 per cent. in division.

In second study drill classes made an improvement of 34.2 per cent. in division.

In first study drill classes made an improvement of 32 per cent. in total number of points.

In second study drill classes made an improvement of 24.2 per cent. in total number of points.

In first study drill classes made an improvement of 5.8 per cent. on first six problems.

In second study drill classes made an improvement of 11.7 per cent. on first six problems.

The greater increase in accuracy in the second study is probably accounted for by the fact that the pupils to whom the first test was given had previously acquired a relatively high standard of accuracy.

None of the data collected indicates that boys are either more or less influenced by drill than girls. The effect of the drill was practically the same.

A future issue of this JOURNAL will contain the results of an investigation to determine when the maximum effects of five minutes' drill in arithmetic is attained.

THE CHILD'S SPEECH.

III. SPEECH WITHOUT WORDS.

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1. Two great types have often been discriminated in the expression of human attitudes, which differ in the materials upon which they depend as largely as in the content of meaning which they reveal—types which are unlike equally in function and history. The language of thought is articulate, the language of feeling inarticulate. The latter depends for its form upon diversities of pitch and quality and their fluent modulations. The former is monotonous in its qualitative elements, but highly diversified in its articulate forms.

The language of feeling is natural and common to all men, untaught and spontaneous; the language of thought is artificial in its construction and is acquired from those who already possess it. Its features are subject to constant variation and development, since it does not rest upon any natural and proper type to which the individual tends to revert in the absence of a special model. The forms of speech possessed by two branches of a common stock, therefore, will be diversified in proportion to the differences in the conditions under which they live and the period of time during which they have been separated.

2. The language of feeling is also subject to conventionalization, but each individual and generation, apart from the inheritance of a social tradition, will fall back upon a natural type of expression which is common to the species. The utterance of feeling is thus universal and permanent, while that of thought is variable and common only to those who are members of a single social group. Feeling is expressed alike by the child and the adult; it is manifested before the process of

imitation has been set up; it persists until the end of life. Its form becomes clearer and approaches more closely to the fundamental type in proportion as the condition of excitement mounts and the conventions of social usage are in consequence swept aside.

Of this inarticulate language through which human feeling is expressed the sigh, the shriek, the groan, the laugh, the wail are typical examples. These forms of utterance are common to all races and ages of man; they are the expression of clearly differentiated experiences in respect to the affective overtone by which they are characterized, and it is this quality of feeling which such inarticulate utterances express. They tell of danger, delight, wonder, grief, suffering, fury, terror, but convey no intelligence of the situation which has given rise to these feelings. The intellectual analysis of the experience calls for a different type of expression which it is the aim of articulate speech to supply.

3. From this inarticulate expression of affective states the system of articulate language later arises. The child begins life with a cry, which is in part a physiological reaction, but which one cannot but regard as also in part an expression of the affective tone of experience aroused by the system of stimuli to which he is at the first moment of life exposed. The cry is one of general discomfort. At first this is almost the only type of reaction which stimuli call forth. Comfort and content have little positive expression; they are manifested in the quietness and silence of the infant. Expression of an active character is called forth at this stage chiefly by discomfort. The reaction is a generalized one which is the manifestation of a qualitative condition common to a variety of situations—hunger, cold, wetness, pain, etc., and the cry of the babe is at the outset practically undifferentiated.

This monotonous cry is the matrix out of which arise, first, a series of individualized but still inarticulate cries, and later the system of articulate expressions from which intelligible speech is to be constructed. Cries specifically indicative of hunger, pain, discontent, impatience, anger, differentiate from the primitive cry. The quality becomes more varied, the range increases, there is more modulation of force, and inflec-

tions begin to show among the different expressions, which nurse and mother soon learn to recognize and interpret.

4. To the primitive expression of discomfort there is also added a series of sounds expressing another quality of experience. The condition of general well-being comes to have a positive manifestation, probably connected with the increasing stability and nutritive level of the organism, in a system of movements and cries, kickings, wriggings, rhythmical movements of the body, accompanied by cooing, gurgling, crowing, laughing and modified shrieks.

These developing expressional processes, even though regarded as spontaneous or reflex activities, and not as indicative of an experience illuminated by intelligence or differentiated emotion, do nevertheless play an important part in bringing new elements and meanings into the inner experience itself, and thereby become agencies in the general process of mental development which is going on. Even in adult life the appearance of novel forms of expression persists, and when they occur, though through sheer accident, the experience is shot through with a new sense of power and freedom. At such moments the zest of life is awakened or revived with a vigor which is literally a new quality added to its content. Such novelty, both in the form of expression and in the affective overtone which accompanies it, must be of continual occurrence in the first few years of childhood, when all experience is new, when the world rushes in at every gate of sense and thought in a tumultuous flood and unceasingly calls forth reactions which reveal to the unfolding consciousness of the child a nature within itself whose richness and variety it must empirically discover as the adventurous pioneer explores the features of a land hitherto unknown.

5. The world with which the child is becoming acquainted is constituted by expression and the range of inner activity no less than by impression and outer change, and the former, or intrinsic factor, is as full of novelty and wonder as the latter. Only when its characteristic reaction is called forth does the child enter into the essential significance of an impression with which it has already grown familiar. "My own little girl," says Kirkpatrick, "was well along in her second year before she laughed aloud, and until she herself laughed was

disturbed and even frightened by the sudden laughter of others." After such an experience as is represented in the child's own laughter the recurrence of the impression no longer takes place in its former objective (and in this case terrifying) relations only, but becomes the index of a situation which is now known from within, and therefore tends to call forth at once a sympathetic reaction and to induce a congruous state of feeling. The child is now charmed and delighted by the laughter which formerly startled or even alarmed him.

6. From this primitive stage, in which experience in all its phases is almost purely affective, the child passes forward to that in which it is predominately intellectual by a continuous series of transitions. In the development of speech we are able to trace at least the gross features of this process and to point out a series of modifications which takes place in the unreflective manifestation of affective attitudes as it gives place like a dissolving view to the forms of articulate speech which succeed it.

The child's first use of true language—that is, his employment of certain modes of expression for the purpose of indicating to others his mental attitude—does not involve articulate speech. It is superposed upon his earlier spontaneous expressions of emotional states and makes use of its forms. This material of inarticulate expression is now both modified in character and transformed in significance. No longer the mere result of an existing state of mind—which it may, therefore, but in a limited way, be said to have expressed in the preceding stage—it becomes a medium for the communication of an ideal purpose. It is not a result, but a means, and its new use depends upon the rise in the child's mind of the idea of a social world and of the concept of language proper. He has grasped the thought that specific actions may be used as signs to indicate the system of meanings which he desires to express. The old cries are varied, inflected and combined in numberless ways. The series of modifications thus introduced is the result of no aimless vagary, but is specifically designed as a vehicle of communication, to attract attention, to indicate objects and to express a group of mental attitudes which call for adaptation between himself and the external

world, attitudes of curiosity, surprise, discontent, longing, dislike, and so on.

Without the aid of articulate words the child soon becomes able to make known in this way a wide range of ideas, purposes, wants and feelings. His voice perhaps now reaches a higher level of flexibility than at any subsequent stage in consequence of the continued dependence upon tone, inflection, emphasis and melody for the expression of a complex of ideas and attitudes constantly increasing in richness.

7. This short but distinct period constitutes the first stage in the history of the child's speech. His modified cries are true words—or, rather, interjectional sentences in their significance—which he employs because he finds them understood. Their use marks his entrance into the world of signs and their social value. When, after its short regime, this first medium of expression gives way before the advance of articulate speech, the child has only to substitute a new system of symbols for the old. The transition is thereby made more natural and easy, for he has already been doing the very thing which he is now to accomplish by means of the new mechanism of verbal signs.

The system of modified cries forms but a part of the total materials of expression upon which the child draws during this first period. Facial expression, gesture and general attitude combine with the voice in pointing his meaning and making eloquent his appeal. This element persists in the child's expression long after articulate speech has been so far mastered as to become his general means of communication. The vivacity of his utterance is greatly heightened by the complex accompaniment which attends his speech—the musical qualities of voice, the changes of the expressive eyes and of complexion, together with general muscular modifications. The whole flexible body is engaged in an illuminative pantomime as the child speaks, and the intelligibility of his utterance as well as its beauty owes much to this running wordless commentary.

Now, while this concomitant forms a recourse of which the child reflectively avails himself, owing to the inadequacies of his speech as an expressive medium, it is also—as it continues

to be in all natural actors—largely a spontaneous manifestation of the intellectual and emotional excitement which possesses him. It thus constitutes a true transitional phase between the primitive expression of affective experience which marks the first stage of infancy and complete dependence upon a system of conceptual signs such as written communication exemplifies.

8. The process of acquiring speech now consists in the gradual substitution of verbal expressions for this inarticulate musical utterance, with its pantomimic accompaniment. It is a task which has many difficulties and takes long to accomplish. Indeed, the substitution never attains completeness in speech itself. It is not until the development of writing that language achieves logical independence and the system of verbal concepts becomes the sole dependence of the thinker in expressing his meaning. Human speech, in its higher forms even more than in its lower, is marked by a wealth of musical qualities as well as by inflection and dramatic emphasis.

Through the addition of these supplementary media human speech is redeemed from its syntactic defects and made a living, thrilling medium for the expression of thought and emotion. Its use is also characteristically accompanied by a system of interpretative gestures which in the rudest culture is indispensable to intercourse and in the technical art of the actor attains the status of an independent medium of expression. The system of verbal concepts nevertheless constitutes the specific means by which every human being seeks to express and communicate his meaning. Putting aside, therefore, the question of its supplementation, the development of this system of concept will be approached in the next paper of this series.

(To be continued.)

THE INFLUENCE OF ENVIRONMENT ON MENTAL ABILITY AS SHOWN BY BINET-SIMON TESTS.

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The relative power of nature and nurture to affect mental ability is one of those mooted points of psychology which have been interminably discussed. On the one side are men like Galton and Thorndike, who believe that a person's mental ability is congenital, that it cannot be increased during life, that training and experience can do no more than supply means for the expression of the developing ability inherently present. On the other hand, Ward, Swift and their followers hold that the human being is born with certain instincts or tendencies common to all of his species, and that the environmental influences (including under this term food, home and education) to which he is subjected determine the extent and power of his mental ability as well as the direction it will take.

What direct scientific investigation has been made on the question has been on the side of heredity only. Galton's studies showed the tendency of genius and high mental ability to occur in members of the same family, or, in other words, to be hereditary. Thorndike's tests of twins and other siblings resulted in somewhat similar conclusions. Swift's and Ward's beliefs are based mainly on observation. So far as we are aware there has been no previous attempt to test environmental influences alone. The present study is an effort in that direction.

For our purpose three groups of children were selected whose environments represented as nearly as possible types which might be classified as good, medium and poor. A brief description will best illustrate what is included under these heads. Each group consisted of 70 children of different ages

and about equal proportions of each sex. The first was taken from the Horace Mann School of Teachers College, Columbia University. These children are all from wealthy, or, at least, unburdened, families, and they have had abundant opportunities for development and self-expression, such as travel, mingling with people of culture, access to books and magazines and ample leisure time.

The second group was from the Speyer School, also of Teachers College. The Speyer School draws its pupils from the families of the wage-earner and the small-business man. There is no wealth there, neither is there great poverty. We visited the homes of more than half of the Speyer children that were tested, and found them to be fairly representative of the comfortable middle class. The children are well fed, well clothed, and have, generally, sufficient time for play, with the usual experiences of the average city child.

The third group was from the Hebrew Sheltering Orphan Asylum of New York. The children tested have been inmates of the asylum for periods of time ranging from four to ten years. Of those who are not actual orphans many were brought to the Sheltering Home by the Gerry Society because of destitution; a few have parents committed for insanity; none has had the advantages of a real home environment. In the institution itself the life is necessarily restricted by the régime of a "barrack-plan" orphanage.

These groups seemed to us to cover roughly the differences that might appear in children's lives. Ranging, as they do, from the most advantageous economic surroundings to the most barren, they should, all other things being equal, bring to light any change in mental capacity that environment might cause.

The tests used were from the Binet-Simon measuring scale for intelligence. We followed, in a general way, the revisions made by Professor Goddard of Vineland, N. J., and some of the suggestions of Terman and Childs. In a few cases we substituted our own tests for the regular ones or changed them from one year to another, but the tests as finally given were identically the same, year for year, for the children of each group. Whether or not the tests are correctly graded is a

question which did not seriously concern us. We found them, in fact, as will be seen further on, to be somewhat too easy for each year; that is, the twelve-year tests are just about suitable for the eleven-year child, and so on. But for our purpose they were admirably suited—first, because we were using them for comparison merely, so that any inaccuracies of grading would show up equally in each group; second, because the tests *are* graded, and thus give children of older ages opportunity to show intelligence of a kind different from the younger ones; third, because they test all-around mental capacity, or intelligence, rather than mere school training, and thus would be more likely to show the effects of different environmental influences which we desired to measure.

Our method of testing was to begin with each child at its physical age and carry it through three years of tests. If it was unable to pass the tests of its own age, it was taken back on the scale until the true mental age was found. In some cases children of extraordinary ability were able to go up the scale four or five years above the physical age. In registering such a score the three best years of the child's record were counted. Each single test had five possible counts: O for a complete failure, P for an answer that had an element of correctness, F for a passing mark, G for a very good answer, E for an exceptionally good answer. Table I shows the records of a few ten-year Speyer School children:

TABLE I.

Sample of Scoring Sheet.

Indi- vidual.	IX						X						XI					XII						
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	1	2	3	4	5	6	7
No. 24							G	G	G	G	G	G	F	G	G	G	G	F	G	O	O	F	O	F
No. 25							G	G	F	F	G	F	O	F	F	O	G	F	O	G	O	O	O	O
No. 26	G	F	P	G	G	G	P	P	O	F	P	P	G	O	O	F	O							
No. 27							E	G	E	E	G	G	O	G	E	P	G	G	O	P	G	E	O	F
No. 28							F	F	F	G	G	F	O	O	O	G	G	O	O	F	G	G	F	O
No. 29							G	P	F	E	G	O	O	O	G	G	O	P	F	F	F	G	O	F

Such a system of scoring presents greater possibilities for accurate estimation of the quality of an answer, such as was needed for our purpose, than would a numerical score. For purposes of comparison, however, it was necessary to translate the results of the tests into numerical terms, and for this the following key was used:

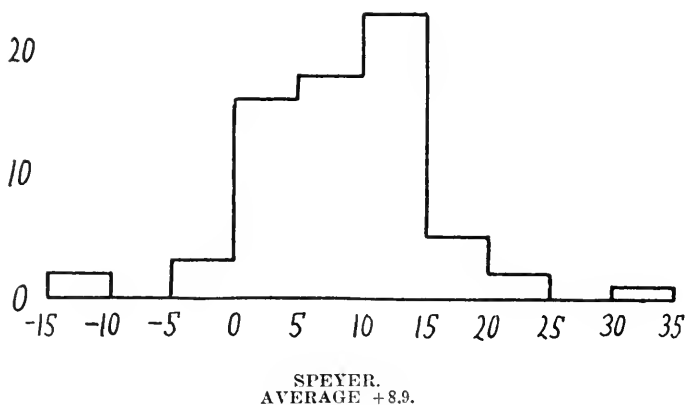
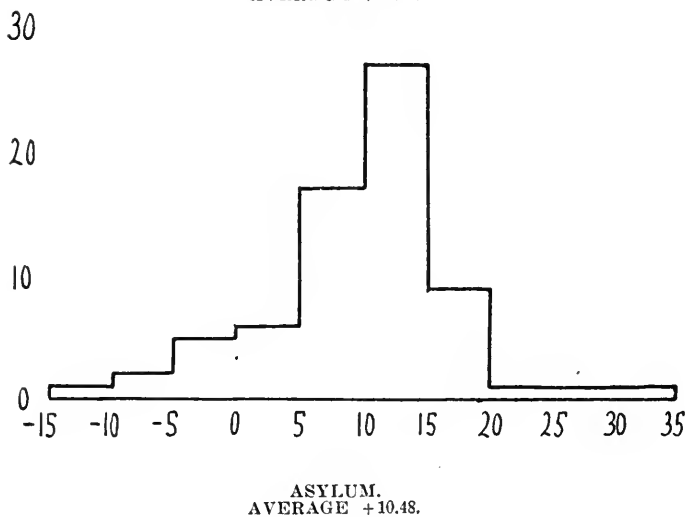
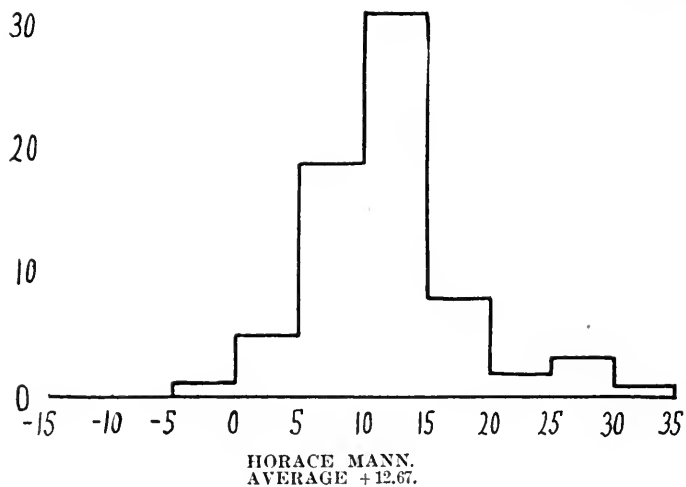


FIG. 1.
Comparison of the three schools. The base-line in each case is the scale for achievement in the test in comparison with the average for one's age. The height above each fraction of the base line represents the frequency of that degree of achievement.

2 yr. Below.	1 yr. Below.	At Age.	1 yr. Above.	2 yr. Above.
O = -4	O = -3	O = -2	O = 0	O = 0
P = -3	P = -2	P = -1	P = +1	P = +3
F = -2	F = -1	F = 0	F = +2	F = +4
G = -1	G = 0	G = +1	G = +3	G = +5
E = 0	E = 1	E = +2	E = +4	E = +6

According to this, a final score of 0 would denote normality, that is, that the child's physical age and mental age correspond; a score of 14 would mean that the child's mental age was one year above the physical age, 25 two years above, — 5.5 one year below, — 14 two years below. (See Table II.)

TABLE II.

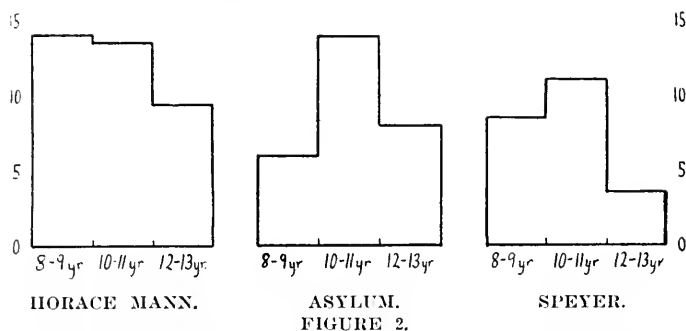
Sample of Scoring Sheet Translated Numerically.

Individual.	IX	X	XI	XII	Total.	Av. Score.
	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5	1 2 3 4 5 6 7		
No. 24....		1 1 1 1 1 1	2 3 3 3 3	4 5 0 0 4 0 4	38	12.67
No. 25....		1 1 0 0 1 0	0 2 2 0 3	4 0 5 0 0 0 0	19	6.33
No. 26....	0 -1 -2 0 0 0	-1 -1 -2 0 -1 -1	3 0 0 2 0		-4	-1.33
No. 27....		2 1 2 2 1 1	0 3 4 1 3	5 0 3 5 6 0 4	43	14.33
No. 28....		0 0 0 1 1 0	6 0 0 3 3	0 0 4 5 5 4 0	26	8.67
No. 29....		1 -1 0 2 1 -2	0 0 3 3 0	3 4 4 4 5 0 4	31	10.33

The results of all the tests are arranged graphically in Figure 1. The general average of the Horace Mann group was 12.67, Orphan Asylum 10.48, Speyer 8.9. The remarkable fact about these general averages is that they differ so slightly, the difference between either two contiguous groups being less than 3, or, approximately, what would correspond on our scale to one-sixth of a year of mental life. The direction of the curve in each group shows the tests to have been too easy, since the maxima should very probably have appeared two places to the left, under the 0 to 5 space; but this does not in any way affect the value of the comparison.

It will be seen that Horace Mann and the Orphan Asylum lead in the number of children scoring very high. Horace Mann has 45 with a score of 11 or above, and the Asylum 39, while Speyer has 31. On the other hand, Speyer has 39 children whose scores range comparatively low, while Horace Mann has 25, and the Asylum 31. Of those children whose scores show them to be below their physical age in mentality the Asylum has 8, Speyer 5, and Horace Mann 1.

Separating the scores into age groups (Figure 2), we find that Horace Mann children of 8 and 9 and 12 and 13 years test out higher than children of the same age of the other institu-



A comparison of the results for different age-groups in the three schools.

tions. The Asylum children are slightly higher in the tenth and eleventh years. Speyer's 12- and 13-year group is very far below the others. These age-group scores, however, are not of importance, because there were not sufficient children in each group to give reliable results.

In the different phases of the tests some interesting developments occurred. The Asylum children tested highest in the use of language, the average scores of the three institutions in those tests involving the use of language, as reading, sentence building, rhyming, definitions, and filling in omitted words, being Asylum 12, Horace Mann 10.5, Speyer 7.9. Some of the tests were of ability to reason, ethical and matter-of-fact problems being considered. In these the average scores were Horace Mann 11.4, Asylum 10.7, Speyer 8. Other tests involved power of observation, sense discrimination, and counting and reckoning ability. In these the averages of the three institutions varied, no one being highest in all.

Judging from the results of these tests, then, it would seem that environment does not greatly affect mental capacity, if at all. If environment was the determining factor that its exponents argue it to be, the measuring scale for intelligence should have placed Horace Mann at the head, with an appreciable interval dividing it from Speyer in the second place, and the Asylum at the foot, with an appreciable distance between it and Speyer. Instead, the three institutions showed very small and inconsistent differences. Speyer, which should have been second, was invariably last, and Horace Mann and the Asylum, whose environmental influences are diametrically opposite, were always close together, the Asylum in many instances being ahead.

That these conclusions are not definitely established goes without saying. There were many sources of possible error in the tests which must be considered. First, the value of the Binet-Simon scale as a test of intelligence is not sure. We have already mentioned our reasons for considering it excellent for the purpose of comparing groups. The recent revisions by Terman and Childs (*JOURNAL OF EDUCATIONAL PSYCHOLOGY*, February-May, 1912) would tend to make it a scale for measuring school training merely rather than general mental ability, but in its previous form, with some rearrangement, it seemed to answer our purpose admirably. Second comes the matter of race. The children of the Asylum are all Jewish, mainly of Russian nationality; the children tested in Horace Mann were partly Jewish, and the rest of German, Italian, Spanish, and native American parentage, mainly the last; the children tested in Speyer were of German, Italian, and native American parentage, mainly the last. It would be difficult to find three other groups in each of which the members are living under conditions so alike as in these, but to guard against the variation which a preponderance of one race or nationality in any one group might produce each group should be composed of children of different race and nationality whose environments are as nearly alike as possible. Third, the number of children tested was small. It is quite obvious that tests of 210 children are not sufficient to definitely settle so momentous a question. Much more work along this same line, in which the difference of environmental influence is the basis of investigation, is required.

The time may come when educators, after tracing all the factors of immediate and remote ancestral heritage of any individual, will be able to determine just what sort of training will best serve to develop the powers latent within him. The present study is an effort in that direction. We shall be satisfied if it serves to throw some light, however little, upon this intensely interesting problem.

COMMUNICATIONS AND DISCUSSIONS.

A NEW ATTITUDE TOWARD THE SCIENTIFIC STUDY OF EDUCATION.

Prof. William Lyon Phelps of Yale, in his "Teaching in School and College," Macmillan, 1912, guards himself by a preface, assuring us that he does not mean to be "egotistically cocksure." His attempt to be confessional rather than hortatory is not altogether successful. The little book is, however, thoroughly readable. Spicy comments and clean-cut realistically put illustrations, with a sure sense of humor, carry the reader through the series of chapters.

His introduction, Chapter I, contains the only confessional passages, and here there is no accompanying contriteness of heart, we fear. The author's attitude toward Education as an independent branch of study is interesting. His is indeed a new attitude toward the professional student of education, more difficult to describe than the sort of mental nausea of the Fites and Shoreys. I am inclined to think that most of our academic colleagues are now to be classed with Professor Phelps. Here is their attitude (*italics mine*) with Phelps as their spokesman:

"Teaching is an art, not a science; and I may as well confess at the start that I *know nothing whatever of the science of pedagogy*. I am unable, therefore, *to use technical terms*, as I am not sure what they mean. I know a great many children, boys and girls, young men and maidens, but I have never studied the *psychology of the child*, and *have never attempted to find the way to a boy's heart by a scientific formula*. The science of pedagogy is today a recognized branch of learning, and there are admirable men and women who *seem to have achieved distinction in its pursuit*; but I have been too busy teaching and studying my own specialty—English Literature—to give any serious or prolonged attention to that or any other science. I am not proud of my ignorance, nor in the least disposed to slur the importance of fields of knowledge through which I have never passed. But *the study of pedagogy*, however valuable or interesting, *is not the most essential part of a teacher's intellectual or moral outfit*. One might know all about the science of pedagogy, and yet be a poor teacher of Latin, English, French or Mathematics; just as one might

be able to pass a brilliant examination on the functions of the brain, and yet not be an original or profound thinker. Perhaps the ideal combination is that suggested by Herbert Spencer in 'Education': 'Science will not make an artist. But innate faculty alone will not suffice. Only when Genius is married to Science can the highest results be produced.' The difficulty is that I, in common with most teachers of literature, have neither genius nor science. *We are forced to substitute sympathy, humor, devotion and common sense.* This book is written to help the ordinary teacher, not the inspired genius; he is a rare bird, and no pedestrian can show the way of an eagle in the air.

"My attitude toward professional pedagogy is like my attitude toward phrenology. I believe that a successful business man can tell more about a stranger's character in one interview than a professional phrenologist can by feeling of the bumps on his skull. The ablest professors of education are now employing their time and talents more sensibly than formerly; they are studying and teaching the history of education, and they are endeavoring to connect school and college in a logically progressive way."

Here we have in a foreword the treatment which characterizes the book. The chapter topics are: School Teaching and Discipline, Private School Teaching and Scholarship, Imagination in Teaching, The Efficiency of College Teaching, Education and Instruction, English Composition, English Pronunciation, Teaching English Literature, The Moral Aspect of Teaching. "Teaching is an art, not a science." The author emotionalizes and dogmatizes in a delightful personal vein. Teaching is a passion, and he instances the operations and suggests the favorable occasions for this passionate expression and communion. He is "unable to use technical terms." Throughout one fails to find any connection of his admonitions and spirited advices with a broadly conceived educational philosophy or psychology, or even administrative policy. He has "never attempted to find the way to a boy's heart by a scientific formula." The author's hallucination here is very interesting. He is running from some formula deduced from the alchemy of Herbart. He will be bound by no rule, act absolutely by inspiration, and bid everybody abandon any uniformity of procedure in teaching and as a body follow (the author's kind of?) inspiration! "We (teachers of English who know no education) are forced to substitute sympathy, humor, devotion and

common sense." The implication is that students of education have erected an ideal procedure which is a substitute for and which defies "sympathy, humor, devotion and common sense."

Into the book, which undoubtedly has the charm of an interesting and erudite personality and successful teacher, a student of education will look in vain for general principles with which to steer himself under circumstances not precisely analagous to the author's. One notes also that by subtle suggestion the author does not believe there are any such principles. This is the point of our critical comment. This is possibly what the last paragraph above may mean. Beyond a sort of patronizing and evasive acknowledgment that modern students of education may be a bit better than their pedagogic ancestors, I can find no meaning in the paragraph.

Incidentally there are many striking and some novel doctrines advanced by the author, bolstered up in the main by the successful practice of one or two eminent individuals or by reference to the author's boyhood and youth experiences, or by a case of some exceptional student in his classes. The reader will be enriched by interesting hypotheses, and will probably be stimulated to seek some more scientific assurance of their validity. Among the positions taken by the author which savor of healthy heresy, as well as naive assurance of their absolute validity, are his definite expressions on such subjects as the marking system, college examinations, imagination in the teaching of Latin, History or Mathematics, memorization exercises, classroom discipline, on theme-writing, instruction in grammar, English pronunciation, and on the Ph.D. degree standard, and the moral standard essential for teachers.

The book contributes undoubtedly, but it contributes *one whole-some person's random reactions to multitudes of pedagogical situations unclassified*. Out of dozens of books of this nature, confessional personal pedagogical autobiographies, one may hope a pedagogy of English teaching may come. This is indeed all that the author claims for his work. I have emphasized what he subtly disclaims; that is, the desirability in all subjects of the more systematic and more than personal formulation of the *specific pedagogies* of the different subjects of school and college programs of study, an undertaking which I venture to contend need not be wholly devoid of "sympathy, humor, devotion and common sense."

CHARLES HUGHES JOHNSTON.

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ABSTRACTS AND REVIEWS.

Enzyklopädisches Handbuch der Kinderschutzes und der Jugendfürsorge. Edited, with the co-operation of prominent experts, by DRs. TH. HELLER, FR. SCHILLER AND M. TAUBE. Leipzig: Wilhelm Engelmann, 1911. 2 Vols. Pp. viii, 371 and 416. Mk. 34.

The field of child welfare has greatly broadened during the past two decades. Public and private philanthropy has become organized and systematized. Provision for delinquent, dependent and defective children has been accepted as a social obligation. Furthermore, we have recognized that the larger social problems set for us by the child cannot be solved by philanthropic measures alone. Modern educational investigation and modern child study have yielded a new and larger conception of the need for conserving the normal child and ensuring his optimal development. This field is now so extensive that no one person can hope to keep abreast of the developments in its numerous sections.

The editors of this encyclopedic handbook have therefore sought, with characteristic German thoroughness, to provide a manual in which every topic germane to this field shall be authoritatively discussed by an expert. The volumes are designed to provide a conspectus of the whole situation, to show what needs to be done and what needs to be known, as well as what has been done and what is known.

In all, 116 experts contribute signed articles. Our readers will recognize such names as Stern, Kemsies, Gutzmann, Maennel, Eulenberg, Burgerstein and other Continental authorities.

Some idea of the scope and nature of the work may be given by citing the following topics taken at random: Juvenile crime, handwriting, school physicians, alcoholism, Sunday-schools, deafness, vagabondage, sex enlightenment, American juvenile courts, hypnotism, coeducation, speech defects, disciplinary classes, children's testimony, scoliosis, school baths, the family, the kindergarten, infectious diseases, art education, clothing, examinations, infant mortality. The treatment of each topic is sufficiently extended to serve the needs of the ordinary reader—juvenile crime, for instance, has six pages; sleep nearly eight pages (with five charts and several tables)—and is supplemented in nearly every instance by reference to the literature.

While, for the most part, European conditions are described, and European, especially German, literature is drawn upon, the handbook is worth adding to the libraries of schools of education, teachers of education, and of institutions and specialists who are concerned with child protection and child welfare. G. M. W.

J. WELTON, M.A. *The Psychology of Education*. New York and London: Macmillan & Co., 1911. Pp. xxi, 507. \$2.40 net.

This stout and attractive-looking volume is in some respects profound and in others superficial. It is profound by the grace of God through the gift to the author of a genial and well-poised personality. He writes in a cheerful vein, usually with an artist's touch, and generally with real insight into his theme. The student who has kept in intimate touch with the scholarly development of psychology and education will be somewhat disappointed that the work does not sufficiently incorporate the letter and spirit of these sciences. Both subjects have been making rapid progress in many lines of experimental research and controlled observation. They have approximated the dignity of sciences. Psycho-physics, genetic psychology and child study are particularly fertile in studies which are illuminating for education. There is almost no reference in the entire volume to any researches in these fields, and there is too marked an indisposition to profit by them.

Besides its literary excellence, there are many commendable features of the work. It is comprehensive—more so than would be indicated by the chapter headings. Psychologically, it adopts entirely the genetic viewpoint. It has outgrown the slavery of intellectualistic psychology, and prefers the "actual play of forces in real human life." "The influence of intellectualistic adult psychology is everywhere to be seen in education and is everywhere unfortunate" (p. 8). Pedagogically, too, the points of view and treatment are wholesome. The author is uncompromisingly severe with the dead formalism of educational practice. "Nothing is worth learning which is not in some sense worthy to be a permanent possession" (p. 368). He is wholly in sympathy with the vocational and occupational aspects of education. Throughout the volume it is evident that education centers in the vital intercourse of healthy personalities.

The seeming ignorance of the author of the scientific phases of psychology and pedagogy is wilful. He has a chronic aversion to the

pedantry of science. "More real insight of the kind the educator needs is to be obtained from such a profound study of human character and motive as the *Egotist* of George Meredith than from works on abstract psychology" (p. 46-7). The author accordingly prefers to devote two pages to an analysis of Sherlock Holmes on the flow of imagery rather than give any space at all to Ribot's *Creative Imagination*, or refer to the work of any "sectarian" psychologist on the topic. He has 129 quotations and illustrations from litterateurs (most of them happily selected), as against 35 from recent temporary psychologists and philosophers, and 8 from modern educators; or, to put it in another way, we find in the work entitled "The Psychology of Education" about half as many quotations from Browning as from all recent students of these topics combined; or, again, he finds more that is worth quoting upon contemporary educational matters in Shelley than in Lloyd Morgan, in Emerson than in William James, in F. M. Crawford than in Thorndike, and in Shakespeare than in Wundt.

All technical material and laborious research is left out. There is a discussion of the nervous system without the mention of Donaldson; of attention without Titchener; of character development without Dr. Bryant; of imitation without Tarde, Royce or Baldwin; of individual differences without Thorndike; of interest without De Garmo or the Herbartians; of the nature of childhood without Fiske, Butler or Oppenheim, and so on through a long list. On sex differences he has space for some flippant nonsense from Crawford, but none for the mature studies of Havelock Ellis. In discussing the stages of child life he resorts to loose description and illustration from nursery and mothers' club anecdotes and children's sayings. That "pedantic importation known as 'culture epochs'" he dismisses with a single paragraph without anywhere in the volume being aware of the good work that has been done from the empirical standpoint on *psychological* epochs. A host of names of the best students do not so much as receive honorable mention.

The eschewing of science—such is the supposedly necessary price of a literary style and an attractive treatment of the subject. That the same commodities may be purchased in other coin is amply illustrated by Huxley and Darwin in biology, James and Binet in psychology, Paulsen and Bergson in philosophy, and many writers in education. One might hope that it should become a custom to use the

artist's touch in setting forth facts and to observe the principles of aesthetics in constructing science. Professor Welton is perfectly correct in regarding fact, detail, formulas, laws and statistics, without their larger significance, as wearisome. It is equally true that it is coming to be as impossible to write on a psychological or pedagogical theme without the refinement and insight that come from a conscientious handling of details as it is in astronomy, physics and chemistry. The poetry of pedagogy, like the poetry of a symphony orchestra, must depend upon the number and variety of concrete elements that enter into it, and is in proportion to their richness and variety. It goes without saying that they must be perfectly blended and interpreted. If it is true that a piping woodwind, a scraping string or a rattling drum is not in itself music, it is equally true that the waving of the baton of a director does not constitute the symphony. There is no occasion for pedagogy either to grovel, or, on the other hand, to be satisfied with generalities.

The part of the volume that most nearly approximates a real contribution to educational psychology is Chapter IV on General Mental Endowment, in which the content of the mental life is pictured in terms of the refinement and blending of the instincts. In this chapter the author has had the patience to master the points of view of Morgan, Wundt, Hobhouse, Darwin, James, and especially Ribot on the evolution of instinct, and is able consequently to speak from deeper levels of insight. Nor is it less entertaining than Chapter XII on Ideals, for example, in which Browning, Meredith, Pope, Wordsworth, Shelley, Shakespeare and Tennyson play the leading parts in the orchestra.

EDWIN D. STARBUCK.

University of Iowa.

Graduate and Undergraduate Courses and Degrees in Education. Normal Schools and University Departments of Education. The Present Status of Education as a Science. Papers by various authors presented at the meeting of the Society of College Teachers of Education, St. Louis, Mo., February 27, 28, 29, 1912. The School Review Monographs, No. 11. The University of Chicago Press. Publications of the Society, No. 7. Pp. 153. 50 cents net.

It would be hard to treat in brief compass a group of problems more important to the college teacher of education than those covered in this monograph. Education has won its fight for recognition

as a college subject, as the existence of the Society, with 115 members, sufficiently proves, but its place in the curriculum is still so uncertain that there is great need of agreement among teachers of education themselves as to the organization of this work for both academic and professional purposes. Three aims for university instruction in education are at least distinguishable and often actually entertained: the presentation of the subject, as of general human interest, to students who do not intend to teach; the training of teachers, especially high-school teachers, and school officers, and the increase of our knowledge of fact and law in education as a distinct field of human endeavor. That is, college teachers of education are lecturing on the principles and problems of contemporary education and on the history of education to undergraduates, and in some cases to graduates, who have no immediate professional aim, and who may be taking the courses simply as part of a general academic program. They are giving technical courses to teachers, both prospective and experienced, both undergraduate and graduate, and they are conducting researches and giving research courses. The problems discussed in this monograph arise naturally out of these endeavors, and because of external hostility and indifference the solution of them is beset with more than the common difficulties attendant on the organization of a comparatively new subject.

It must be confessed that the monograph as a whole is somewhat disappointing. When a single pamphlet deals with so many subjects of first importance, perhaps this is not surprising, and the fact that this volume is, in truth, only a report of proceedings, and not strictly a monograph at all, is further extenuation; but from the titles a teacher of education is inspired with hopes which are not completely satisfied. Many of the papers are admirable, but some are very brief, inconclusive and lacking in suggestiveness. Differences of opinion on certain points are obviously due to differing conceptions of the subject treated. If the papers had been prepared earlier and exchanged among the authors, a sharper definition of issues might have resulted, and careful work by an editorial committee might have sifted the points of difference and avoided mere presentation of divergent opinion.

The differentiation of undergraduate and graduate work is treated by Professor Buchner and Professor De Garmo. Professor Buchner's long paper is interesting, if discursive, but his conclusions

ignore the difference in purpose between teacher training and general instruction in education for the non-professional student. "The distinction (between undergraduate and graduate work) points, on the one hand, to the accepted and assured *facts* about education that the undergraduate is to learn for both theoretical and practical purposes, and, on the other, to *problems* and methods appropriate in solving them which the graduate is to attack so as to return with inferences justifiable in the light of the data that are available. Put in a more practical manner, it is the difference between really preparing a teacher to teach under the conditions of the school, and carefully training the student to analyze those factors which determine the results to be secured by that teaching." But, in reality, the undergraduate, whether he is to teach or not, needs most an awakening to problems and to methods by which they may be worked out, and the graduate often needs direct training for an immediate attack on professional duties. Professor De Garmo seems to have the actual situation more presently in mind, but his paper is only an argument in the form of a brief, and is difficult to appraise.

The relation of Normal Schools to Departments and Schools of Education in Universities is discussed by Dean James, Dean Johnston and Professor Jones. The first two papers, especially Dean Johnston's, are thoroughgoing and conclusive arguments for the restriction of normal-school work to "the problems of the grades, *administrative, supervisory and pedagogical*." "The university, with help from the colleges, would then work intensively upon the secondary problem * * * (and) * * * research * * *." Adequacy, economy and accessibility of instruction are given by Dean James as criteria under which the university must be adjudged the best institution for the training of high-school teachers and higher school officers. These papers deal rather with the distinction between normal-school work and university work than with the possible co-operation between the two institutions.

The three papers on undergraduate degrees in education by Professor Lough, Professor Heck and President McKeag are suggestive, but rather too brief and divergent to be as helpful as one could wish. Professor Lough expects that the Ph.D will eventually "stand not only for the mastery of a subject, but also for some acquaintance with the principles and methods of teaching it"—a reduction of the Ph.D. to a teacher's degree which will find small favor even among

teachers of education. President McKeag's able paper adds a number of valuable suggestions to Professor Lough's discussion. Professor Heck outlines in some detail a course in school hygiene.

The papers on the present status of education as a science form the most profitable portion of the pamphlet. The most helpful is that of Professor Henmon, who discusses educational psychology and urges especially more attention to the process of learning than to methods of teaching—a much-needed shift of emphasis. Professor Ruediger in a carefully-organized paper discusses the course in the principles of education, having in mind the instruction needed in a definite course for teachers—a course aiming to establish general conceptions concerning the school and the curriculum. Professor Baldwin attacks the philosophical treatment proposed by Professor Ruediger and defends a strictly scientific treatment—a development of principles directly from educational data by experiment and investigation. Obviously both are needed. He adds a list of "Selected References in the Science of Education and Experimental Education" (the latter term courts ridicule; why not say "The Experimental Study of Education?"), which is helpful, but very uneven. Professor Parker of Chicago University contributes a good article on educational methods, which Professor McMurry rather acidly criticises because it does not come to a conclusion on the scientific value of each class of principles presented.

The monograph contains much that teachers of education will find enlightening and useful, especially in the papers of Professor Heck, President Wilson, Professor Henmon, Professor Ruediger, Professor Baldwin and Professor Parker, but its greatest value is in providing a basis for discussion from which the Society may advance to standpoints which can be held with full strength against the attacks of those enraged with what Professor Henmon calls "*an epidemic of rabies paedagogorum.*"

Harvard University.

HENRY W. HOLMES.

L. A. ROBINSON, PH.D. *Mental Fatigue and School Efficiency: An Experimental Study in Winthrop Training School and Other Schools in South Carolina.* Bulletin No. 2, Vol. V, of the Winthrop Normal and Industrial College of South Carolina. R. L. Bryan Company, Columbia, S. C.

"The aim of this study was to obtain knowledge of the working ability of children for different periods of the single session of the

school day, and to determine the influence of mental fatigue on the working rate, together with the effects of recesses and recuperative exercises." The method followed was that of the division of subjects into groups of equal ability used by Winch and by Thorndike. All the school grades from the third to the ninth of the Winthrop Training School were used, and material in several phases of school work (arithmetic, algebra, history and Latin) was presented at periods of the beginning and the closing of the single session of school work, 9 A. M. to 2 P. M. All the tests were given by the author himself.

The first tests were short tests (three minutes) in simple arithmetic. These tests do not conclusively indicate any marked fatigue at the end of the school period in the eighth and ninth grades. They appeared to be at first conditioned by stimulative influences of novelty and fatigue, but this was offset by later practice effects. They showed no decrease in efficiency at the end of the school period—an agreement with the results of Thorndike and Ebbinghaus. Other tests of longer and more difficult arithmetic operations (five to ten minutes in length, according to the ability of the class) indicate a dropping off in ability between 12 and 1 o'clock, but the results obtained at 2 P. M. equal those of 9 A. M.

Tests were then given to investigate the loss or gain in efficiency during continuous effort. The aim was not only to determine fatigue for different parts of the hour, but also for the different hours of the day. Ten-minute tests were given in algebra, history and Latin. The results show rhythmic fluctuations in efficiency in waves of about 20 minutes. This conclusion, which may need further verification, seems to harmonize with what is known of the ordinary physiological processes, such as pulsations and respirations. In no case is the efficiency curve from morning till evening a straight line, but rather rhythmically fluctuating.

There is some illuminating study of mental inertia, mental stimulations (purposive attainment, pleasure in accomplishment and novelty) and effects of interruptions (lunches, recesses, singing and gymnastics).

The total results of the investigation are carefully summarized as follows:

- (1) Individual variations appeared, but were not a primary subject of the investigation.
- (2) There is no evidence of extreme fatigue or overpressure in

the daily work of the children. Exceptions to this are usually caused by worry. In general, children show weariness rather than fatigue in the work, and it is therefore the teacher's problem to provide the proper mental stimulation to keep up interest in the work.

(3) Purpose, pleasure in accomplishment and interest in novelty and variety are strong and valuable stimulations.

(4) Pupils are not at a maximum of efficiency at the beginning of the session, nor after extended interruptions or too frequent changes, especially in the upper grades.

(5) Recesses are especially valuable for younger children. Short recesses (10 to 15 minutes) show improvement in the work that immediately follows them, but long recesses (25 minutes) do not, although they do afford complete relaxation from nervous strain.

(6) Gymnastic exercise for 10-minute periods benefits work which immediately follows it, but 25 minutes of folk-dancing is very damaging to immediate mental efficiency.

(7) Lunches in the five-hour school session are of no immediate benefit to mental work, but rather the reverse. Nevertheless, it is foolhardy and cruel to neglect the necessary food supply for the sake of a little mental efficiency.

(8) A 10-minute singing period increases mental efficiency.

(9) There are small variations in mental efficiency at different parts of the day, which reach a maximum at 10 to 11, show a slight drop from 12 to 1, and then take a rise until the close of the period at 2. For any particular subject, as algebra, one period seems as good as another, but alternation of easy and hard work is valuable, as it affords change and relaxation.

(10) In continuous work high and low efficiency alternate rhythmically, preventing excessive fatigue. It is important that teachers recognize these variations in working ability and adjust work accordingly.

(11) Recitation periods must be long enough to overcome mental inertia and also to take advantage of the benefits of "warming up." Prolonged attention must be cultivated also, yet it is impossible to state what should be the exact length of the recitation periods. They probably should be 40 minutes in length for high-school girls, but very much less in the lower grades.

EDGAR A. DOLL.

Vineland, N. J.

A. FRANKEN. *Ueber die Erziehbarkeit der Erinnerungsaussage bei Schulkindern*. Zeitschrift für pädagogische Psychologie und experimentelle Pädagogik, 12: 1911, 635-642.

Report is a product of observation, retention, memory and linguistic ability. Previous work of the educability of report, *e. g.*, that of Oppenheim, Borst, Diehl, has left uncertain to what extent the improvement secured was distributed to each of these component factors. Franken's plan was to eliminate observation and retention and to minimize the linguistic formulation, then to test the educability of the transfer of knowledge into report. In other words, can children be taught to be more careful in stating that they do or do not know this or that thing?

His method was neat. About 100 questions were arranged which related to the school work of his subjects (150 pupils, aged 11 to 12.5 years). These questions were propounded twice, first as "decisive" and secondly as "determining" questions (*Methode der Entscheidungs-und-Bestimmungsfragen*). The first series is answered merely by "yes" or "no." For example, "Do you know on what river Lyons is situated?" The second series demands a specific answer, *e. g.*, "On what river is Lyons situated?" In one section the work was interrupted after 50 questions had been given in both forms; the pupils then checked up their own answers, and were thus made forcibly cognizant of their failings before the second 50 questions were given. In another section the experimenter simply announced, after the first 50 questions, that the second 50 questions would be followed by "control" questions (*Bestimmungsfragen*). Six possibilities may be realized for any question: it may be answered by either "yes" or "no" in the first form, and either answer may be followed by a right, a wrong, or by no answer in the second form.

The author has developed an elaborate system for scoring the data. He obtains, by computation, seven coefficients of report, *viz.*: range of correct knowledge, readiness of knowledge, accuracy of report, reliability of report, resistance to feeling of familiarity, and veracity. Without going into detail as to the effect of the training on the several coefficients, it may be stated that the general results of the checking by the pupils of their errors in the first half of the work, and of their knowledge that control questions would follow, appeared in a reduction of the "yes" answers. In other words, the training made them more cautious in asserting that they could answer the

questions correctly. However, the "yes-no" sequence did not entirely disappear, and still less did the "yes-false" sequence. The training was, therefore, not sufficient to destroy completely overestimation of their knowledge. "Resistance to feeling of familiarity" (*Hemmung des Bekanntheitsgefühls*) was particularly augmented in the first section of pupils. It follows that the confronting of the pupil with the demonstration of his unreliability and proneness to error has a distinct pedagogical value, and produces a greater improvement than does the mere knowledge that every assertion made will be subsequently tested by specific questions.

The reviewer believes that this method of studying report has many suggestive features. Further experiments might profitably be tried by the same method, but with the addition of various incentives to improvement which Franken purposely omitted, as, for instance, exhortation, moral appeal, rewards for cautiousness, etc.—incentives which the work of Miss Borst showed to be particularly effective in improving the reports of children. G. M. W.

A. D. SHEFFIELD. *Grammar and Thinking*. New York: G. P. Putnam's Sons, 1912. Pp. xii, 193.

The demand for a harmonized grammatical nomenclature has revealed the need for a preliminary agreement upon the content of grammatical terms, or, as the author expresses it, "a fresh appraisal of the notions that our terms presuppose." His book attempts this appraisal. It is especially interesting to note that students of linguistics are turning for aid to modern psychology and modern logic. The author acknowledges his greatest indebtedness to Wundt's *Völkerpsychologie*, and frequent references are made to William James. Successive chapters discuss the scope of grammar, the sentence rudiment, the word, the sentence as analyzed, the means of grammatical expression, terms of syntax and parts of speech, and the sentence whole. A concluding section on the place of formal grammar in elementary and secondary education is especially good. The book is well written and well organized, and its study cannot fail to furnish the teacher of language with a definite conception of the function of grammar, the lack of which has, in our opinion, often made the grammatical work of the schools quite barren of adequate results. W. C. B.

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EDITORIAL.

As the JOURNAL OF EDUCATIONAL PSYCHOLOGY approaches the end of its third year, its editors and publishers are gratified by the steady increase in esteem and support which the educational public has manifested toward it. In the coming year it will be their earnest endeavor not merely to maintain past standards of excellence, but to make the JOURNAL an even more important factor than ever in the work of the teacher and of the school.

In its original articles the JOURNAL will keep its readers in touch with the most advanced experimental work in education. Experimental ideals are being more and more generally accepted in educational circles, and the progressive educator will find familiarity with these investigations increasingly demanded. The JOURNAL OF EDUCATIONAL PSYCHOLOGY will continue to be one of the foremost organs for the publication of educational researches. Several studies of the

learning process in its various phases are in prospect, and interesting investigations in the hygiene of elementary school pupils will be reported in early numbers. Throughout the year especial emphasis will be laid upon the problems of the high school, and arrangements have been completed to have each important subject of the high-school course surveyed by a competent authority, its problems pointed out, and suggestions made as to the most promising lines of investigation.

Readers of the JOURNAL are invited to make use of the COMMUNICATIONS AND DISCUSSIONS section for the publication of queries, ideas and recommendations in regard to experimental work. Brief reports of investigations now in progress will be especially welcomed. In the ABSTRACTS AND REVIEWS section important educational works will receive detailed and critical consideration at the hands of specialists. A feature of this section will be a series of collective reviews in which the more recent contributions to each phase of educational psychology will be discussed. Educational questions of the day will be commented upon in the EDITORIAL section, and NOTES AND NEWS will chronicle current happenings in the educational world. There will be a reorganization of the CURRENT PERIODICALS section, and the editors hope to present in each number a brief and concise, but fairly adequate, *résumé* of all the important articles pertaining to educational psychology that have appeared in recent issues of scientific journals. An effort will be made to keep this section as closely up to date as possible, and thus to furnish a bird's-eye view of educational activities throughout the world. In the PUBLICATIONS RECEIVED section will be found, as heretofore, brief annotations of educational works as they come from the publishers.

With the aim of contributing more effectively to the advancement of the science of education, the Managing Editor would be pleased to receive from readers of the JOURNAL criticisms, comments and suggestions as to ways in which the JOURNAL might be made more useful and helpful to teachers. Will you not let us have the benefit of your ideas on this subject?

J. C. B.

NOTES AND NEWS.

The department of higher education of the National Education Association, through its secretary, A. R. Mead, has during the last year conducted an investigation dealing with the problem of individual training in colleges. The report bears the title, "How Our Colleges and Universities Maintain Personal Relations with the Individual Students." The compiled results are published in the forthcoming volume of the proceedings of the National Education Association for 1912. The lack of funds made the investigation a limited one, and the results must be considered as descriptive of what higher educational institutions are doing to meet the problem involved. In brief, the report indicates the prominent devices now used to attain personal relations with students, points out the need for such and shows that in some cases the problem has as yet hardly been realized.

A recent report of the director of the bureau of appointments in Oberlin College calls attention to the fact that over half of the Oberlin alumni enter the teaching profession, and suggests that greater emphasis be laid on the work of the Department of Education. He lays stress on the statement that the institution cannot adequately meet the demands put upon it without some arrangement for practice teaching under the supervision of competent instructors.

Two new courses in education have been added to the curriculum of Brown University this year. Professor Jacobs is giving a course in educational administration and Professor Colvin, who has recently come from the University of Illinois, offers a course in experimental education.

Opportunity for observation and practice teaching is now offered to students of education in the University of Wisconsin through the opening of the new University High School. There are 120 students enrolled, and the instruction is given by 16 members of the university faculty. The work of the school covers six years, taking students from the sixth grade of the elementary school, and includes physical training for all classes. Each student is given a medical examination to determine his fitness for the work.

Madam Maria Montessori will inaugurate her training course for primary teachers at Rome, January 15, 1913. The course will last four months, during which Madam Montessori will give three lec-

tures a week at her own house on the theoretical aspects of the work, and at least one morning a week will be spent in studying the practical application of the method in the municipal or other schools in Rome, where it is taught.

Dr. J. E. W. Wallin, director of the psychological clinic in the University of Pittsburgh, has been appointed R. B. Mellon Fellow in the division of smoke investigation in the department of industrial research of the university, with the immediate duties of making a preliminary survey of the literature bearing on the psychology of smoke, and of outlining a plan of investigation in this field. Owing to the lack of bibliographies bearing on this topic, he will be pleased to receive statements from anyone who has made observations on the mental influences of smoke, or who is in a position to supply references.

The psychological laboratory at the Sorbonne, founded and for many years directed by the lamented Alfred Binet, will be conducted by Prof. H. Piéron. The *Année Psychologique*, the current number of which has been prepared by Simon and Lagnier des Bancelles, will be continued under Professor Piéron's editorship.

John Madison Fletcher, Ph.D., has been appointed assistant professor of experimental and clinical psychology at the Newcomb College School of Education, Tulane University.—*Psychological Bulletin*.

Prof. E. C. Wilm of Washburn College has accepted the professorship of philosophy and psychology at Wells College.

Dr. Edward Thompson Fairchild of Lawrence, Kans., superintendent of public instruction of that State and president this year of the National Education Association, has been elected president of the New Hampshire College.—*Science*.

Dr. Herbert H. Woodrow, instructor in psychology at the University of Minnesota, has been promoted to the rank of assistant professor in that institution.

Samuel Weiller Fernberger, Ph.D., instructor in psychology in the University of Pennsylvania, has accepted a similar position at Clark University.—*Science*.

Mr. F. C. Ayers of the University of Chicago has been made head of the department of education at the University of Oregon.

CURRENT PERIODICALS.

(In this section only such articles will be noticed as bear directly or indirectly upon the interests of this Journal.)

REVUE PSYCHOLOGIQUE. Vol. IV, No. 2, June, 1911. E. VINCK. *The Rights of the Child from the Point of View of the Law.* 169-178. The author points out a number of absurdities in the French law in regard to children.

AUG. LE C——. *Contributions to Physical and Mental Paidology.* 178-211. A detailed study of the development of three little girls in the same family. There are elaborate tables of physical measurements by years and a very interesting application of the Binet scale (1908) to determine the mental age of the children.

LEON TOMBU. *Aptitudes for Drawing.* 211-213. In art one must distinguish between skill in execution and breadth of conception. Many great painters have possessed only indifferent skill in drawing, but where the aptitude for this is present it frequently shows itself very early in life by the delight which the child takes in drawing.

I. IOTAYKO. *Alimentary Illusions.* 214-252. A brilliant discussion of the psychology of foods and feeding. The illusions are classified as (1) sensorial, (2) visceral, (3) cerebral and (4) calorific. The author is a radical vegetarian and focuses all the acumen of her psychological analysis upon the task of showing that the arguments for a meat diet are fallacious.

No. 3, September, 1911. O. DECROLY. *Presidential Address at the Opening of the First International Congress of Paidology.* 284-289. An interesting account of the development of psychology and paidology in Belgium.

M. C. SCHUYTEN. *On the Importance of the Paidological Sciences.* 290-294. Address at the opening of the first international congress of paidology. The speaker emphasizes the almost total neglect of the scientific study of the child up to the last two decades, and the rapidity with which interest in the subject is now awakening.

I. IOTAYKO. *Opening Address at the First International Congress of Paidology.* 295-300. A sketch of the developments in psychology and pedagogy which contributed to the new science of paidology and led to the organization of this congress.

W. BECHTEREW. *Social Psychology Considered as an Objective Science.* 301-313. The distinguished Russian neurologist considers social psychology as a study of neuro-psychic reactions in a social environment. He distinguishes it sharply from "Völkerpsychologie," individual psychology and sociology, and emphasizes the study of national character and types of activity. Social psychology includes the domination of the individual by the group, but also the enfranchisement of the individual in his intellectual development.

I. IOTAYKO. *The Life of Psychic Elements.* 317-327. This is a continuation of a previous article in which mental life is conceived as a biological phenomenon with a struggle for existence and sur-

rival of the fittest among the elements of experience. In the present article the phenomena of dissociation and the facts brought to light by psychoanalysis are considered from this point of view. There follows a discussion of the laws of forgetting in their relation to the lapse of time.

No. 4, December, 1911. H. LORENT. *A Synthetic Method of Drawing from Nature*. 345-357. Drawing is a matter of visual perception and motor co-ordination. The method here proposed lays emphasis on the sketch from life. Standing at some distance from the object to be drawn the pupil passes the end of the finger or the tip of the pencil several times over the outline of the model to be drawn. When the movements involved have become closely associated with the visual percept, they are made once more with the pencil touching the paper. This direct translation of visual impression into co-ordinated movements is said to give great accuracy and vividness to pupils' drawings.

I. IOTYKO AND V. KIPIANI. *Role of the Muscular Sense and of Vision in Writing*. 357-361. The authors contend that it is wrong to train children to fix their eyes on what they are writing. It is a source of fatigue, and may contribute greatly to myopia. Experiments with the blind, with normal persons blindfolded, with writing at arm's length and with writing when the head is raised show that the speed is increased and the quality suffers very little when the role of vision is reduced to merely keeping on the line. In writing practice we should, therefore, encourage pupils to develop muscular control, and to depend on vision as little as possible.

I. IOTYKO AND V. KIPIANI. *Role of the Muscular Sense in Drawing*. 362-369. The part played by the muscular sense in drawing was tested experimentally with 80 subjects by having them first draw an object with eyes open, then reproduce the object with eyes closed. There were three groups of experiments: (1) geometrical figures; (2) a butterfly with outspread wings and an imaginary profile, and (3) a drawing from life (vase, glass of water, fountain, gas lamp, etc.). In some cases the geometrical forms were as well drawn with eyes closed as open. The greater the number of details in the other drawings, the greater the simplification which appeared with eyes closed.

VARIA KIPIANI. *The Gymnastic Alphabet*. 370-372. The author refers to Montessori's use of touch in teaching reading, and urges greater use of the muscular sense. This can be done by having the children trace the letters of each word with the finger, either in the air or on paper.

I. IOTYKO. *Report of the First International Congress of Paedology*. 378-414. A fairly detailed abstract of each paper presented at the congress. The abstracts were prepared by the general secretary.

G. SAINT PAUL. *Questionnaire on Internal Language and on Public Speaking*. 415-421. An interesting questionnaire on the factors that contribute to power in oratory.

PUBLICATIONS RECEIVED TO NOVEMBER 1.

(Notice in this section does not preclude a more extended review.)

BERTHA MILLARD BROWN. *Health in Home and Town*. New York: D. C. Heath & Co., 1912. Pp. vi, 312.

This excellent little book will give pupils of the upper elementary grades a good idea of the conditions necessary for healthful living. There are 11 chapters on the construction, furnishing and management of the home, and a like number on home surroundings, city food and water supplies, care of city waste and the diseases incident to city life. The style is simple and forceful, the author is familiar with and makes use of the latest scientific materials, and the attractiveness of the verbal narrative is enhanced by the abundance of well-chosen illustrations. There is a helpful series of bibliographies for the teacher and a good index. The book is a valuable addition to the texts on wholesome living, and should find wide adoption and use in the schools.

H. A. BROWN. *The Readjustment of a Rural High School to the Needs of the Community*. Washington: Bureau of Education, 1912. Bulletin No. 492. Pp. 31.

With all the current insistence upon the necessity of better rural education, opinions are far from unanimous as to the desirable content of such education in its higher phases. This account of the equipment and course of study of the Colebrook (N. H.) Academy is a helpful contribution to the subject.

BAILEY B. BURRITT. *Professional Distribution of College and University Graduates*. Washington: Bureau of Education, 1912. Bulletin No. 491. Pp. 147.

An intensive study of the history of professions in 10 colleges and universities, and statistics of the professional influence of 37 representative institutions.

MARY WHITON CALKINS. *A First Book in Psychology*. New York: The Macmillan Company, 1912. Pp. 426.

"The present revision of this book has been made with three main ends in view: To emphasize the essentially social nature of the conscious self; to accentuate the fact that the study of the self, as thus conceived, involves a study of behavior, and finally to prune the book of expressions which lend themselves to interpretation in terms of an atomistic psychology." (Preface.)

ARTHUR JEROME CULLER. *Interference and Adaptability; An Experimental Study of Their Relation with Special Reference to Individual Differences*. Archives of Psychology, No. 24, July, 1912. Pp. 80. Cloth, \$1.

If an association be formed between a stimulus and a response,

and later another response be associated with the same stimulus, to what extent will the second association interfere with the first? What individual variations does this interference manifest? What is the effect of continued repetition upon such interference? These problems, experimentally investigated in the present monograph, are obviously of prime importance to education, and the discussion merits detailed study by educational psychologists.

SIGMUND FREUD. *Selected Papers on Hysteria and Other Psychoneuroses*. Translated by Dr. A. A. Brill. New York: The Journal of Nervous and Mental Disease Publishing Co., 1912. Pp. 125.

A revised edition enlarged by two chapters, one "On Wild Psychoanalysis" and another "The Future Chances of Psychoanalytic Therapy."

WILLFORD I. KING. *The Elements of Statistical Method*. New York: The Macmillan Company, 1912. Pp. 250.

A very elementary statement particularly adapted to the sociological sciences.

F. M. LEAVITT. *Examples of Industrial Education*. Boston: Ginn & Co., 1912. Pp. viii, 330.

This is perhaps the best brief systematic account of vocational and industrial education that has thus far appeared in America. The demand for industrial education is treated in four chapters devoted, respectively, to the demand from manufacturers, from organized labor, from educators and from social workers. Plans for reorganizing the present educational system in the direction of vocational efficiency are discussed in two chapters. The remainder of the book (with the exception of a chapter on legislation) is devoted to an account of different types of vocational education. A feature of the treatment is a detailed presentation of the organization, administration and curriculums of typical schools. At a time when changes are being made so rapidly that even the special student may easily miss a link in the chain of causes and effects a book of this sort will be gratefully received.

A. T. POFFENBERGER, JR. *Reaction Time to Retinal Stimulation, with Special Reference to the Time Lost in Conduction Through Nerve Centers*. Archives of Psychology, No. 23, July, 1912. Pp. 73. Cloth, 95 cents.

An interesting study of the neural basis of response to visual stimuli.

J. G. ROBERTSON. *Goethe and the Twentieth Century*. New York: G. P. Putnam's Sons, 1912. Pp. 155. 40 cents net.

A brilliant discussion of the genius of Germany's great nineteenth century poet, and his influence upon the thought of the twentieth century.

WALTER SARGENT. *Fine and Industrial Arts in Elementary Schools.*

Boston: Ginn & Co., 1912. Pp. vi, 132.

The first chapter is a thoroughly admirable presentation of the educational value of drawing. We can recall no treatment, by a specialist, of the pedagogy of a special subject which is so clear and sane upon the question of general educational values. Chapter II furnishes a survey of the drawing work through the elementary grades. The following chapters discuss the grade work in detail. This book will be a first-hand help to superintendents and principals who are often handicapped in the general supervision of the "special" subjects, such as drawing, music, manual training and domestic science. Similar monographs in the remaining subjects of this group would be equally useful.

ANNA TOLMAN SMITH. *The Montessori System of Education. An Examination of Characteristic Features set forth in Il Metodo della Pedagogia Scientifica.* Washington: Bureau of Education, 1912. Bulletin No. 489. Pp. 30.

A sympathetic interpretation of the essential Montessori doctrines and a summary of the opinions of prominent English and American educators on the movement.

STEVENSON SMITH. *First Annual Report of the Bailey and Babette Gatzert Foundation for Child Welfare.* Bulletin of the University of Washington, No. 60, 1912. Pp. 15.

The most interesting part of this report is the statement by the director of the foundation regarding the diagnosis of cases which have come before the Juvenile Court of Seattle. In this a question is raised regarding the efficacy of the probation system in the treatment of criminals.

THEODATE L. SMITH. *The Montessori System in Theory and Practice.* New York: Harper & Bros., 1912. Pp. ix, 78. 60 cents net.

One purpose of this little book is "to call the attention of teachers to the principles (of the Montessori system) that are applicable under American conditions, in distinction from incidental results which, though occurring among Italian children, are not possible in a *non-phonetic* language." The statement that the Montessori material is based on "results of scientific experiment, and all that modern psychology has discovered in regard to the development of the senses and intelligence," will surprise educational psychologists who have carefully studied Madam Montessori's book. One of the striking features of that book is the nonchalance with which modern investigations in educational psychology have been almost completely ignored.

JOHN WELHOFF TODD. *Reaction to Multiple Stimuli.* Archives of Psychology, No. 25, August, 1912. Pp. 65. Cloth, 85 cents.

The reaction time to two or more simultaneous stimuli is shorter than to any one of them alone. There is an interesting chapter on reinforcement and inhibition.





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